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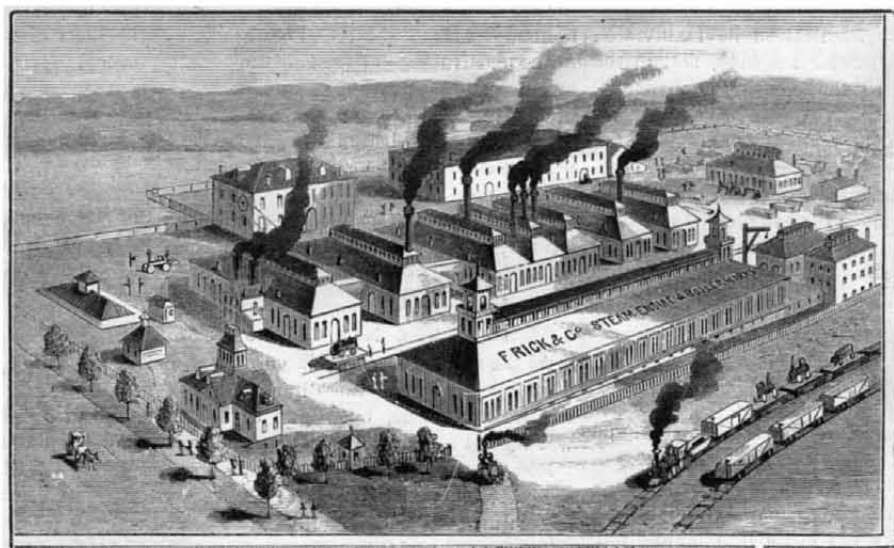

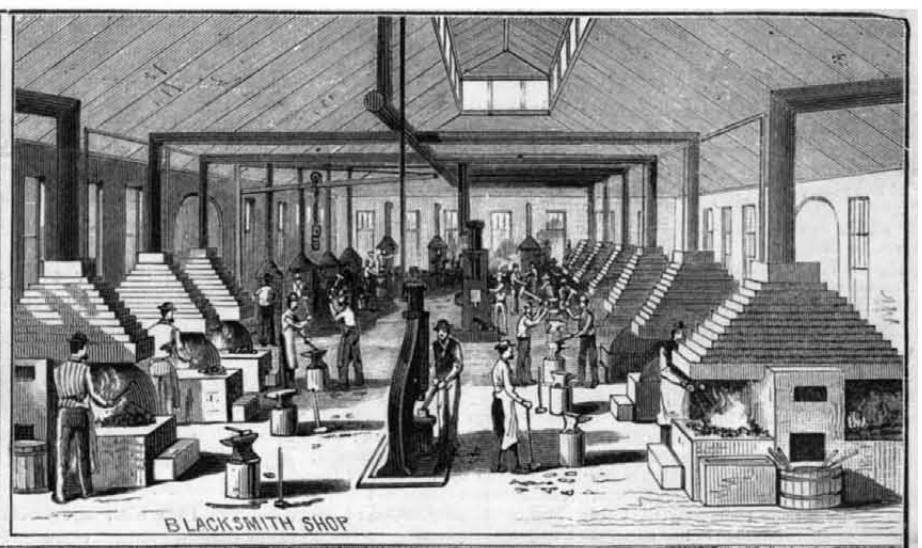

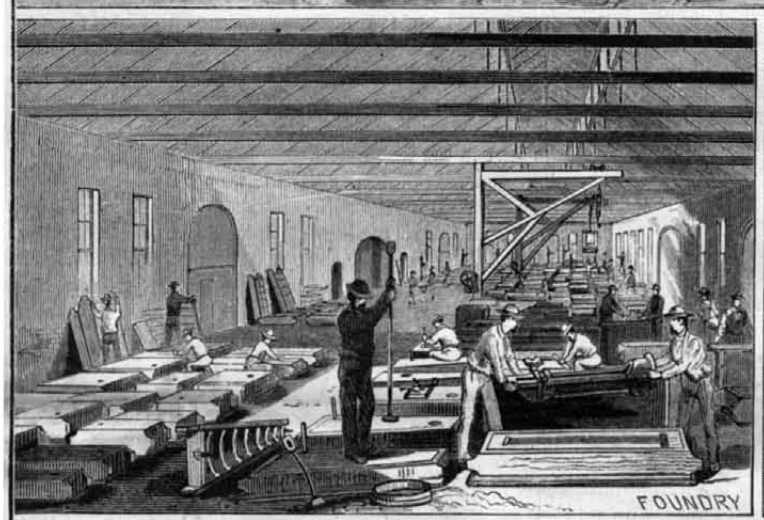

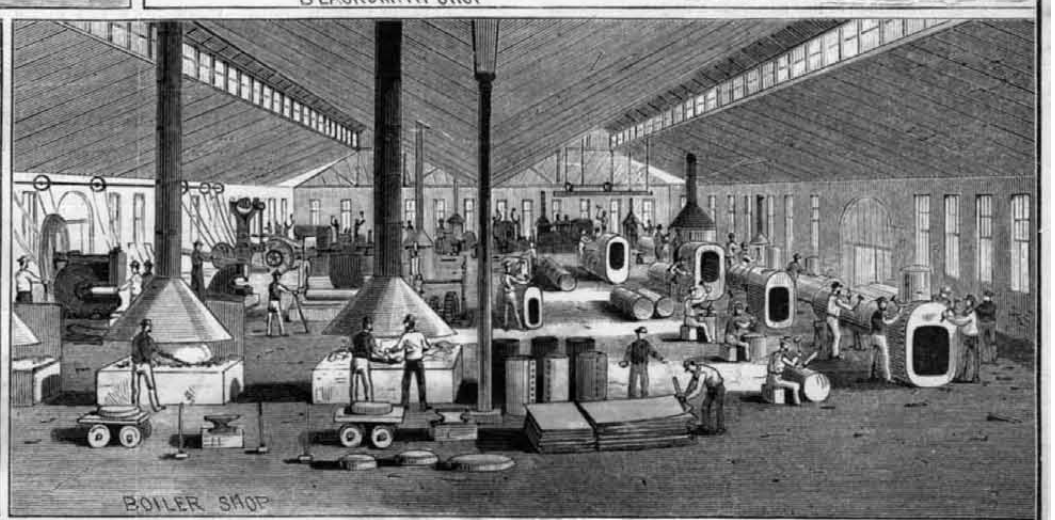

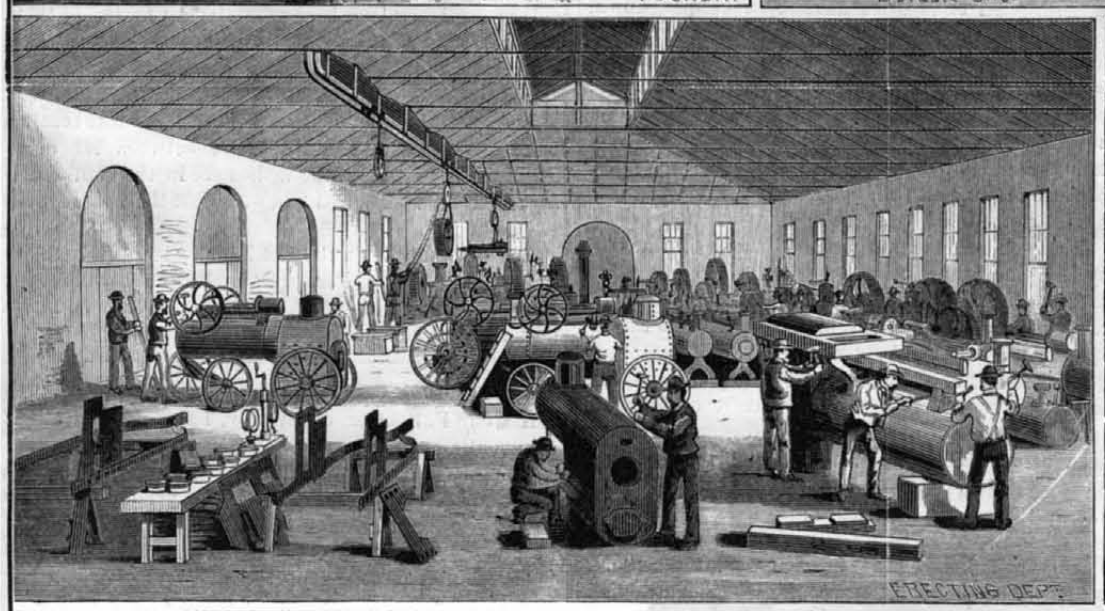

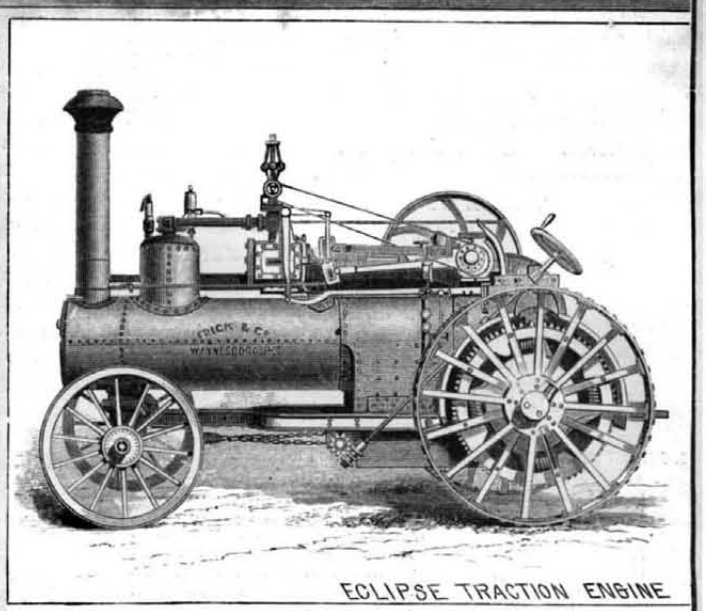

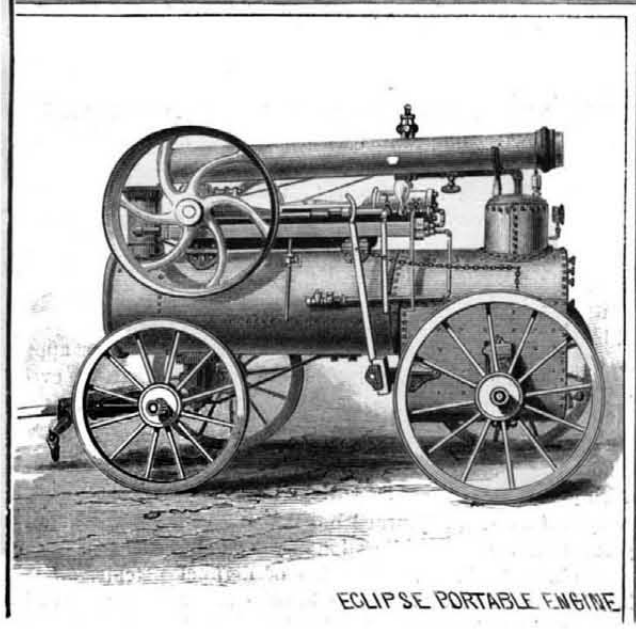

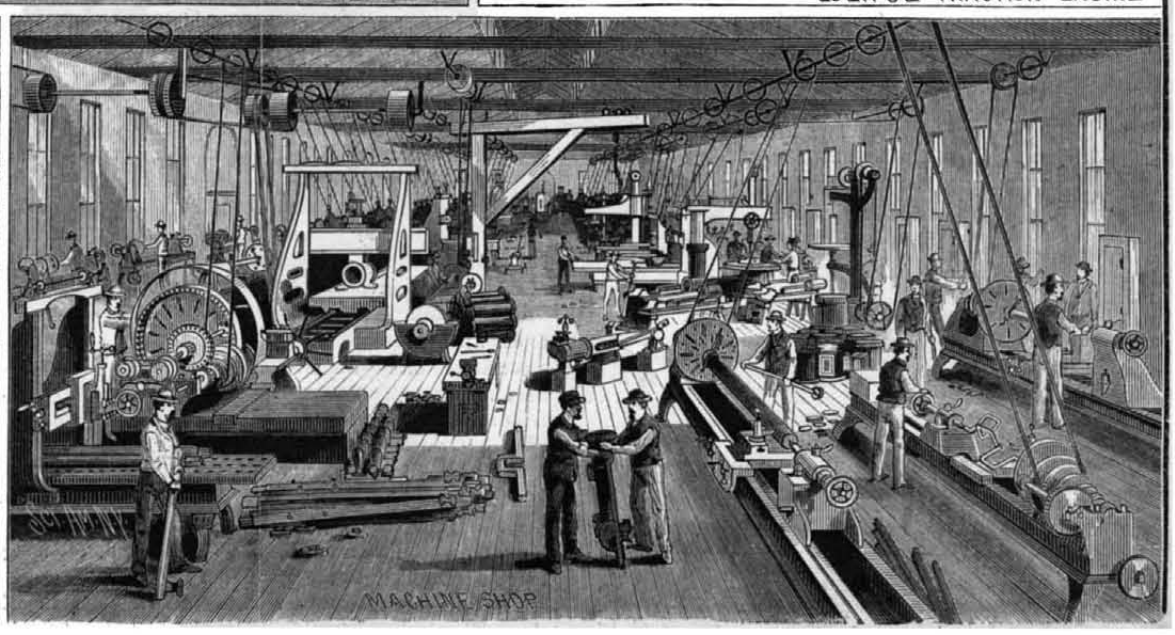

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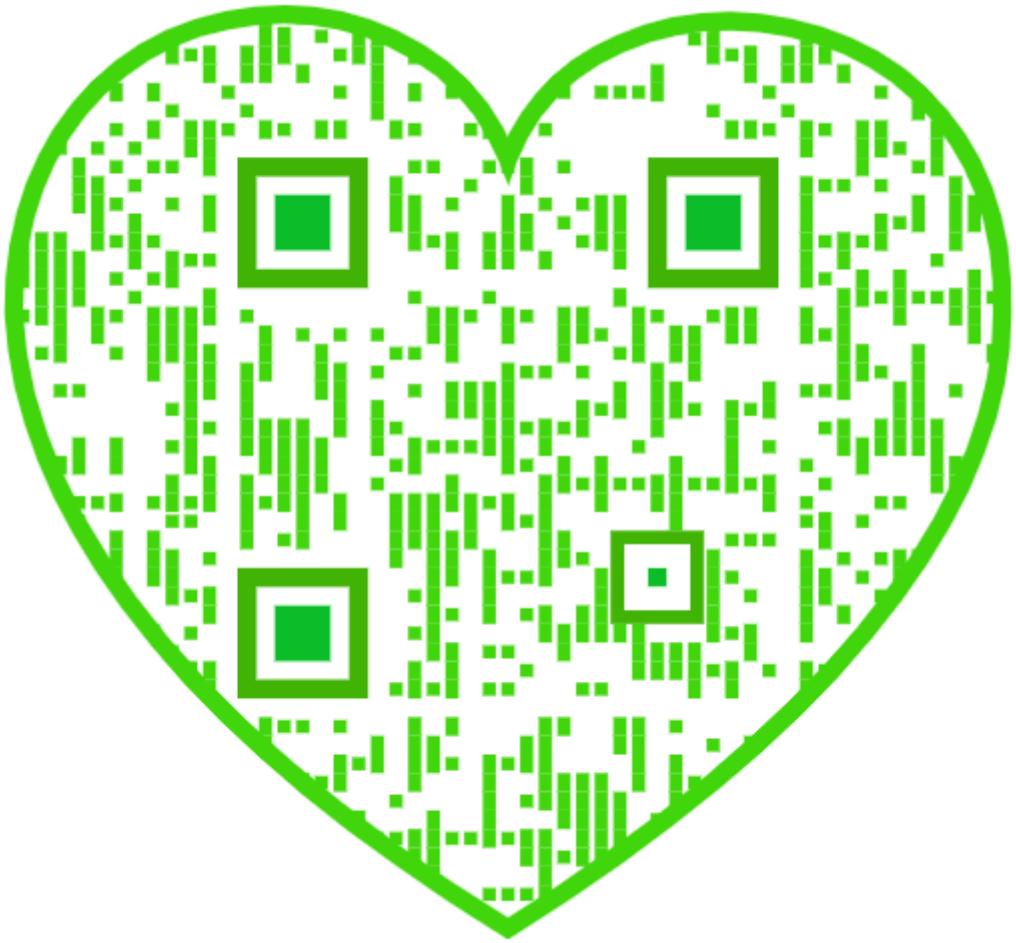

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SALE OF PATENTED MACHINES BY SHERIFF.

Wilder, the owner of a couple of county rights for a patent graining machine, became bankrupt, and his wooden ware factory, its machinery and effects, were sold at auction by the sheriff, including two of the graining machines which were in use in the establishment. Davis, the purchaser, having put the patented machines into use, Wilder brought suit for infringement, claiming that although the sheriff had authority to levy on and sell the machines, such sale did not carry with it the right to use the machines, as that right pertained to the patent, and could not be sold by the sheriff.

The case was tried in the United States Court, Western District of Pennsylvania, before Judges McKennan and Acheson, who held as follows:

"The purchaser of a machine from the patentee acquires no right in the patent itself, and needs none to enable him to enjoy his acquisition. By implication he is invested with a license to use that particular machine, and in the absence of express provision to the contrary such license passes with the machine to successive owners as an incident of proprietorship. That such is the law in case of a voluntary sale of a patented machine by the patentee is incontrovertible. But wherefore should the rights of the sheriff's vendee under an execution against the patentee be less than those of a purchaser directly from the patentee? The rule is that the purchaser at a sheriff's sale succeeds to the beneficial rights of the defendant in the execution to the property sold. (*Chambers v. Smith.*) But why should an exception be made where the subject-matter of sale is a patented machine? To deny to the sheriff's vendee the right to use such machine would in effect prevent its sale upon an execution at law as an operative apparatus, and practically withdraw it from the reach of the owner's execution creditors. The mischievous consequences to such creditors to which the doctrine contended for would lead (now that patented machinery has come into almost universal use) can hardly be estimated. The plaintiff's position is untenable. It is very true that the patent right itself, being incorporeal and vesting exclusively upon statutory grant, cannot be levied on at law, and is available to creditors only by proceeding, in a court of equity. (*Ager vs. Murray*, 105 U. S., 126.) But a patented machine is susceptible of manual seizure, and the unrestricted sale thereof does not involve the transfer of any interest in the patent.

"The conclusion, therefore, is that whatever right to use the patented machine a defendant in an execution may have passes with the machine when sold by the sheriff to his vendee. Hence it follows that the plaintiff has no just cause of complaint against these defendants." Bill dismissed.

EXPERT TESTIMONY.

The domain of science is far from being as exclusive as formerly. It was once a cloistered place where the asperities of life were supposed never to penetrate. All this has been changed. Its boundaries have been thrown down. Every day sees its most abstruse questions brought before the courts for their decisions. On its dogmas depend practical interests, which continually come before the courts for adjudication.

Our reference is to patent cases. Among them every conceivable principle of science is encountered as applied with more or less success to the problems of every-day life. Such cases, for the most part, have to be disposed of by judges. These officials are lawyers, graduates of the bar, and may be assumed not to have any scientific training. Patent cases, such as they have to decide, have two elements. One is the legal status of the invention, the other is the invention itself, its limits, and extent. The first element is to be represented and explained to the court by the counsel; the other element comes outside of his sphere of thought. A specialist is required to explain it. His testimony is taken and placed before the court. Such specialist is called an expert.

It has been settled by experience that a lawsuit is best conducted by a lawyer. From this feeling arose the proverb that the man who is his own lawyer has a fool for a client. A lawsuit has to be conducted by a cool, dispassionate mind. The one in charge of it must be on his guard against all sorts of contingencies. A lawyer in conducting a suit will find ample work in guarding and promoting its legal interests. To study the patented device by itself, and in view of the state of the art, the expert is most available.

It is very rarely that the right or wrong of a question that reaches the courts can be decided on its face. Two views can always be taken, and different theories entertained. This is most true of patent cases. With the progress of invention, and increase in the number of patents, the number of these suits increases. Patents approach each other nearer, decisions multiply, and the difficulty of assigning the limits to each invention increases. The limits are to be settled by a consideration of the mechanical or scientific features of the structure. To present to the court their views upon these features experts are employed. The opposing sides retain opposing experts. They testify under oath, as witnesses called for the information of the court. After direct examination they are cross-examined, and the plausibility of their theories thus tested. Their examinations are often very long, the questions asked them and answered, often at great length, reaching into the hundreds.

Thus the court has presented to it two opposite theories of the mechanical or scientific limits and features of the invention. Each of these theories has been stated on direct examination by opposing experts, and then sifted by a rigorous cross-examination to ascertain its consistency and relevancy. The *prima facie* case is first made out, followed by the defendant's proofs, and then by the complainant's proofs in rebuttal. The experts' evidence is "boiled down" in the final briefs and oral arguments, and so presented to the court, and the case is closed. The opposite theories reach the court in the most assimilable form; his task of judging between them is a comparatively easy one.

The experts, it will be seen, perform a most useful and valuable office. They digest a mass of patents, couched often in very obscure language; they seize upon all the points which can benefit their client, and bring them strongly forward. They dismiss all irrelevant matter, only considering those parts of each patent which apply to the case. Finally, in giving their testimony they have to keep in mind the fact that they are to be subjected to a severe cross-examination, and that any stretching of facts will in the end tell to the disadvantage of the side they are espousing. This is outside of the obligations imposed on their conscience by their oath.

If a thoroughly bad and unjust case is presented to an expert, he should refuse to accept a retainer. But this happens less frequently than might be supposed. Every case has some right on its side, and this should be presented as strongly as possible. Very few cases arise which can be rejected as unjust on mere inspection.

THE RED SPOT ON JUPITER.

At the first regular meeting of the American Astronomical Society, held in the directors' room in the Brooklyn Academy of Music, on March 5, the topic for discussion was the "Physical Changes in Jupiter." A paper on the "Red Spot on Jupiter" was expected from Mr. S. V. White, the president of the society, and there was considerable disappointment over his inability to be present.

The remarks of the members were confined to the recent changes in Jupiter. Messrs. Parkhurst and Serviss described their observations of the great red spot which made its appearance on Jupiter's disk in the summer of 1878, and which within a few weeks has almost entirely disappeared. Others took part in the discussion.

The general opinion expressed was that Jupiter is a world which is yet in a very early stage of its geological history, and that in the great red spot, and in some other remarkable spots which have made their appearance upon its surface, evidences are seen that the planet either has already a solid or liquid surface, or that the formation of such a surface has begun. Several theories to account for the great red spot, which was upward of 30,000 miles long by 6,000 or 8,000 miles wide, were suggested.

One theory was that some volcanic action may have been taking place, which threw up into the atmosphere a mass of smoke and erupted materials which formed the red spot. Another theory was that the crust of the planet where the spot appeared may have been exceptionally heated, so that the atmosphere above it was kept free from clouds. A third theory regarded the red spot as possibly a solidified mass thrust up through its gaseous and liquid surroundings, and forming, perhaps, the nucleus of one of the future continents of the giant planet. The difference between rate of rotation of the red spot and the white spot in the southern belt was referred to. The red spot overtakes the white spot once in 34 days.

The society meets on the first Monday in April in the physical laboratory of the Packer Institute. At that time special papers will be read upon the connection between sun spots and terrestrial meteorology.

SAFETY AT SEA IN A FOG.

Mr. John F. Schultz, of this city, has conceived the idea of preventing collisions at sea in a fog, by means of balloons. He proposes that all vessels should be provided with balloons of sufficient capacity to take a person high enough above the fog to see balloons from other vessels that may be in the vicinity.

The relative positions of the different vessels are then communicated to the captain or other officer of the ship, and by signals between the lookout men in the balloons, the direction of the vessels is so controlled as to avoid collision.

The inventor does not state how the man in the balloon is to communicate with the officers of his ship, but it is presumed by an electric wire attached to the cable line by which the balloon is fastened to the ship's deck. Mr. Schultz does not confine himself to the idea of using balloons on ships alone for preventing collisions, but he thinks lighthouses, life saving stations, etc., should be provided with balloons properly manned to warn vessels of their approach to land. The inventor of the balloon collision preventing idea suggests that the present year, 1883, is a most appropriate time for introducing his system, as it marks an event in ballooning, it being just one hundred years ago that Montgolfier introduced his balloon to the world.

Patents in Congress.

Congress adjourned on the 4th of March, and all the schemes for the alteration of the patent laws, trespass upon inventors' rights, extension of defunct patents, all failed. Inventors may therefore breathe freely for a year at least, and go ahead with the development of new and wonderful discoveries.

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IS GLUCOSE WHOLESOME?

With the increased production (and presumable consumption) of artificial grape sugar and glucose, this question is often asked, and as the data for its correct answer are few, the replies are not entirely satisfactory. No one ever suspected that natural grape sugar was not healthy, but it has been claimed that the artificial product contained sulphates and other salts, that it was made in leaden or copper vessels, and was contaminated with these metals.

These points are easily set at rest by a chemical analysis, but it must be repeated for each different brand. These substances have rarely, if ever, been detected, and opponents of the new sugar have sought to prove that it contained organic principles, uot to be detected by analysis, which were harmful.

In the SCIENTIFIC AMERICAN of February 26, 1881, will be found the result of some experiments made by Dr. Nessler with the unfermentable constituents of grape sugar made from potato starch. As grape sugar is used to a considerable extent in Europe for improving poor wines according to Dr. Gall's process, of course this discovery made a sensation, which induced the German government to prohibit its use for this purpose. Several persons were fined under this law for selling "improved" wine, under the supposition that it would be dangerous to drink it.

Dr. Von Mering has since taken up the subject and repeated Nessler's experiments in a more rational manner. He found that the *dangerous* residue was merely a little dextrine, which instead of being unwholesome is really nutritious.

Previous to Nessler's experiments, Schmitz had published a dissertation (Cologne, 1878), in which he sought to show that this "improved" wine was unwholesome, because after drinking a bottle of such wine in the evening he felt sick at his stomach, and had a headache the next morning. These things sometimes take place when pure liquors are drunk! Schmitz also injected some of this unfermentable residue under the skin of a young dog and of a cat, but the quantity used was unreasonably great, as it bore the same relation to the weight of the animal as 6½ pounds sugar does to an ordinary sized man.

Nessler took such an amount as corresponded to 3½ ounces of sugar at 7 and at 10 A.M., and then felt unwell at noon.

Von Mering in his experiments took the residue from over 20 ounces of starch sugar within three days and yet felt no inconvenience or discomfort. He repeated the experiments in different ways, on other persons, and only in one case, that of a very nervous maiden of 18 years, who took the stuff much against her will, were any bad feelings experienced. The experimenter drank 3 liters of the condemned wine in 3 days, and felt none the worse for it.

Numerous experiments were likewise made on animals, both by hypodermic injections and by introduction into the stomach. Of course the injection of a considerable amount of fluid under the skin will make an animal restless and uneasy, but it was not found that solutions of the unfermentable residues of grape sugar produced any different effect from so much water. But this method of experimentation, so much relied on by Nessler, is not as convincing as administration by the mouth.

The question is of more interest here, from the fact that glucose is used by brewers, and the unfermented residues remain in the beer. It is, therefore, expected that these experiments will be repeated in this country with American glucose from corn. Glycerine is sometimes employed in sweetening wines, but it may also be impure.

CHEAP POSTAGE AT LAST, AND POSTAL NOTES IN ADDITION.

The late Congress passed a law which will be hailed with general satisfaction by the people, namely, the reduction of the rate of postage on letters to two cents. The United States may now be considered as standing at the head of the nations in the matter of cheap postal facilities. We are indebted to Mother England for teaching us the A B C of popular postal transmission; for a score of years her rate has been two cents. But no such costs, difficulties, and distances have had to be overcome in carrying the mails in Great Britain as in this country. Her postal routes are short, her total area being only about one hundred and twenty-two thousand square miles, while ours is not far from three and a half millions of square miles.

Many of our important towns are from one to four thousand miles apart by the postal routes, over which we have been long carrying letters for three cents. Under the new rates of two cents, the quantity of letters to be carried will doubtless be greatly augmented.

The new two cent rate goes into operation October 1. The post office authorities are engaged in preparing a brand new two cent stamp, with which to inaugurate the happy event.

Another accommodation for the public will also soon come into vogue, namely, the issue of postal notes for small sums. By payment at any post office a postal note for the amount is to be given, which will be payable on presentation at any other post office.

The post office authorities are making preparations as rapidly as possible for the issue of the new postal note. It is to be engraved with great care, the work upon it to be equal to that on the national banknotes, in order to protect the holder. It is expected that this note will prove of great benefit to all who desire to use the mails to purchase books, newspapers, and merchandise. The authorities admit that it is an experiment, and do not expect that the system will any more than pay expenses.

LONG DISTANCE TELEPHONING.

A notable experiment in long distance telephoning was recently made on the new compound steel-copper wire of the Postal Telegraph Company, lately completed between New York and Cleveland, Ohio, a stretch of 650 miles.

The compound wire has a diameter of $\frac{7}{32}$ of an inch, consists of a steel wire core, weighing 200 pounds per mile, that will resist a tensile strain of 1,650 pounds, on which copper is deposited to the extent of 500 pounds per mile, with a resistance to the electric current not exceeding $1\frac{7}{10}$ ohms. The wire has seven times greater conductivity than iron wire of equal size, copper being the best conductor known except silver. It has double the tensile strength of iron wire of equal weight when strung on the lines, will last longer, permits the use of low tension currents and small batteries.

Ninety per cent of the wires now in use are No. 9 iron, with a resistance of 20 ohms per mile, and the very best are No. 6 iron, with a resistance of 10 ohms, while the compound wire to be used by this company has a resistance of only $1\frac{7}{10}$ ohms. The resistance of No. 9 iron wire on a line from New York to Chicago, 1,000 miles, is over 20,000 ohms, and on a No. 6 iron wire over 10,000 ohms, and on the compound wire less than 1,700 ohms, thus bringing Chicago telegraphically as near to New York as Philadelphia, and San Francisco as near as Cleveland, compared with the best wires now in use.

When the two compound wires are completed between this city and Chicago, their operating capacities will, it is said, be thirty thousand messages per day.

The new conductor is certainly a great improvement over any land line of similar length heretofore established, and its successful completion marks the opening of a new era in the progress of electrical communication.

We learn from Mr. F. W. Cushing, the manager of the Postal Telegraph Co. in this city, that on the 7th inst. a speaking trial was made over the new line from New York to Cleveland, the transmitting telephone used being that of Mr. Geo. M. Hopkins. The words spoken in this city were, it is said, distinctly heard in Cleveland. The success of the experiment was so conclusive as to satisfy the officers of the company that in the near future the length of the telephonic circuits may be greatly extended; and they believe Chicago will shortly be brought within hearing of New York, a distance of about one thousand miles.

The peculiar feature of the Hopkins transmitter is that one end of the carbon electrode is supported upon or floats on a liquid—mercury—the fluid serving to press the electrode into contact with the carbon button of the telephone diaphragm, without the intervention of a spring or weight. It is, therefore, a self-adjnsting instrument, always in readiness for speaking, whether subject to the loudest or the softest tones, upon the longest or the shortest lines. In our paper for May 8, 1880, we gave illustrations of this instrument; little expecting, at that time, it would ever be used to convey speech from New York to Cleveland.

We congratulate the Postal Telegraph Company upon the successful operation of this first link of their new wire. It is likely to revolutionize the telegraphic service of the world by leading the way to the substitution of easy, economical, and scientific lines and modes of working in place of the present systems, which, by comparison, are difficult, costly to operate, and unscientific.

Flying Foxes in Australia.

Once I visited a great "camp" of fruit eating bats, "flying foxes" as they are here called (*Pteropus poliocephalus*).

In a dense piece of bush, consisting principally of young trees, the trees were hung all over with these bats, looking like great black fruits.

As we approached, the bats showed signs of uneasiness, and after the first shot were rather difficult to approach, moving on from before us and pitching in a fresh tree some way ahead.

The bats uttered a curious cackling cry when disturbed. They were in enormous numbers, and although thousands had been shot not long before by a large party got together for the purpose, their numbers were not perceptibly reduced. They do great harm to the fruit orchards about Paramatta, and the fruit growers there organize parties to shoot them. They have the cunning to choose a set of trees where the undergrowth is exceedingly dense, and where it is therefore difficult to get at them.

I shot seven or eight, but they are very apt to hang up by their hooked claws when shot, and I lost several. I could find no Nycteribia living on these bats, although these insects are usually so common on the various species of Pteropus.—*Prof. Mosely.*

Cheap Black Ink.

The *Industrie Blatter* recommends the following formula as furnishing a good and cheap writing ink:

French extract of Campeachy wood 100 parts, lime water 800 parts, phenol (carbolic acid) 3 parts, hydrochloric acid 25 parts, gum arabic 30 parts, red chromate of potash 3 parts.

The extract is first dissolved in the lime water on a steam bath with frequent stirring or shaking, after which the carbolic and hydrochloric acids are added, and change the red color to a brownish yellow. It is then heated half an hour on steam bath and set aside to cool. It is next filtered, and the gum and bichromate, dissolved in water, are added. Enough water is then added to make up the solution to 1,800 parts. This ink is a fine red when used, but soon gets black.

CURIOSITIES OF THE RAILWAY CENSUS.

In our number for March 3, under the above heading, was a paragraph relating to the difference between the receipts of railways for transportation of passengers and freights, in which the results were rendered rather absurd by the use of mighty dollar marks instead of humble cents. The paragraph should read as follows:

The freight carried in 1880 was two hundred and ninety-one millions of tons, for which the railways charged 1·29 cents per ton per mile, and made a profit of 0·53 of a cent per ton per mile.

The number of passengers carried was two hundred and seventy millions, for which they each paid an average of 2·33 cents per mile, and the companies made a profit of 0·62 of a cent per mile. If the passengers are counted by weight, allowing 14 passengers to the ton, then the receipts of the companies for their two-legged freight was $3.26 per ton per mile, and their profit was 86·8 cents per ton per mile.

By the ton, then, passengers yield sixteen times more profit to the railways than ordinary freight.

We renew the suggestion that there seems to be an opportunity here for the exercise of genius by railway managers in the development of new and better inducements for travel. Various suggestions, doubtless, will rise in the minds of readers, such as the adoption of improved means for safety, smoothing and better ballasting of roadbeds, faster time, easier and more commodious cars. But without going through the entire list of improvements that might help travel, we will name one subject that railway officials might study and proceed to carry out at little expense, as a help to passenger traffic, namely, the inauguration in every city, town, and village of a thoroughly good and cheap service for the use of customers between their homes and the stations. At present the companies leave their patrons to the tender mercies of extortionate hackmen and baggage smashers; and so general are the inconveniences that exist between residence and car that probably not a hundred tickets are bought where a thousand would be purchased if a first-rate service, such as we have indicated, could be realized.

The Great Floods of 1883.

The present year will be memorable as the witness of some of the most remarkable floods of modern times. For weeks past the principal river regions both of Europe and the United States have been the scenes of unparalleled disasters. Several large cities, many towns, and hundreds of villages have been inundated, cattle, buildings, and products, the accumulations of years of industrious toil, have been swept away, many lives lost, thousands of people rendered homeless and reduced to poverty. Financially the losses are to be measured by millions of dollars.

In this country the valleys of the Ohio and Mississippi Rivers, with many of their tributaries, have been converted into vast inland lakes; the ancient time, when the Father of Waters, from the Gulf of Mexico to the mouth of the Ohio, had an average width of fifty miles, seems almost to have returned.

We might fill many columns with the details of extraordinary occurrences pertaining to the present floods; but the following, as a general example, must suffice: "Memphis, Tenn., March 7, 1883: The nearest point of land to Tiptonville, Tenn., is ten miles distant. The town is in the midst of a great lake. Two-thirds of the county in which it is situated are deeply flooded, and nearly every farmer in the overflowed districts has lost his corn, hogs, and cotton. Fences have been swept away as well as outhouses and many dwellings. Hardly a farmhouse has been left along Reelfoot Lake, which is now rushing like a torrent through Obion and Deer Rivers and into the Mississippi.

Alexander H. Stephens.

One of the prominent historical characters of the great South has passed to his final rest, after many years of active industry maintained in the face of personal sufferings that would have compelled ordinary people to keep to their beds. Alexander H. Stephens was born in Georgia, February 11, 1812. He graduated at the head of his class at the University of Georgia in 1832. Although poor health was his inseparable companion, he achieved fame as a young lawyer. In 1836 he began public life in the State Legislature. In 1843 he was elected to Congress; and was almost a continuous Representative from that year to 1882, except during the period of the rebellion. Last year he was chosen Governor of Georgia, and died in the harness, at Atlanta, on the 3d of March. The physicians say that his death resulted from overwork of the brain—his duties having been heavy and his attention to them unabated.

His personal appearance was remarkable. His weight was about ninety pounds, and in these later years he always occupied a wheeled chair, being unable to walk. His voice was like that of a child. He was the author of a "Constitutional View of the War," of which 100,000 copies were sold, and also of a "History of the United States," just issued.

Important Tax Reductions.

The Congress which has just adjourned made several important changes in the revenue law, by which taxes are reduced and some inconveniences of doing business are removed. For example: On and after July 1, 1883, the stamp tax ceases on bank checks, drafts, orders, vouchers, and the tax on matches, medicines, perfumes, etc. The taxes on tobacco and dealings therein are also greatly reduced.

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IMPROVED REFRIGERATOR.

We give herewith an engraving of an improved refrigerator by which vessels containing liquids may be kept cold, and from which the vessels may be removed without opening the refrigerator, and without admitting the outer air directly to the cooling chamber.

In this refrigerator are combined an ice receptacle and one or more cooling chambers below the ice receptacle, and it is provided with means whereby vessels may be suspended or introduced into the ice receptacle without admitting the external air.

The inclosing case of the refrigerator may be made in any desired form, and divided into several cooling compartments. In the upper wall of the refrigerator case there are several apertures in which are suspended the vessels containing the liquids to be cooled, the vessels being introduced from the top and projecting into the ice chamber, which is separated from the lower portion of the refrigerator by a horizontal partition.

The ice is introduced through the long door that opens downward. The openings in the top of the ice chamber are lined with suitable non-conducting material, which acts as a packing to prevent the circulation of air. In some of the openings there are rubber disks slotted radially, which admit of inserting and removing vessels of various sizes without requiring any particular attention to the matter of closing the openings, as they close automatically as soon as the vessel is removed. All the apertures may be fitted in this way, or they may be provided with suitable tight fitting non-conducting covers or valves, either entire or having openings adapted to vessels of different sizes and shapes.

BLAKE'S REFRIGERATOR.

In this refrigerator access may be had to the contents of the cans or vessels without disturbing the contents in the cooling chambers, and any air that enters through the openings in the top passes directly into the ice receptacle and is cooled before it can reach the cooling chambers below. Access may be had to the contents of the cooling chambers without disturbing the cans, and the outer air that enters into these chambers will be cooled before it can reach the vessels inserted in the top.

This improved refrigerator is particularly applicable to cooling butter and milk, and the inventor informs us that it is very economical in the use of ice.

The invention has been patented by Mr. J. C. Blake, of Petersburg, Va.

A Carbureted Incandescent Gas Light.

Another new intense gas burner has been constructed to meet the demand for a white light, and is reported to be in use at a gold lace factory at Colombes, in France. It is the invention of M. Helouis, who calls it the carbo-oxhydric burner; and it is described as being a combination of the incandescent and carbureted systems of gas lighting. The burner can be employed to render incaudescent any refractory body, and also to effect the combustion of a jet of highly carbureted gas. In both cases an auxiliary jet of pure oxygen is utilized. The method of operating appears to be as follows:

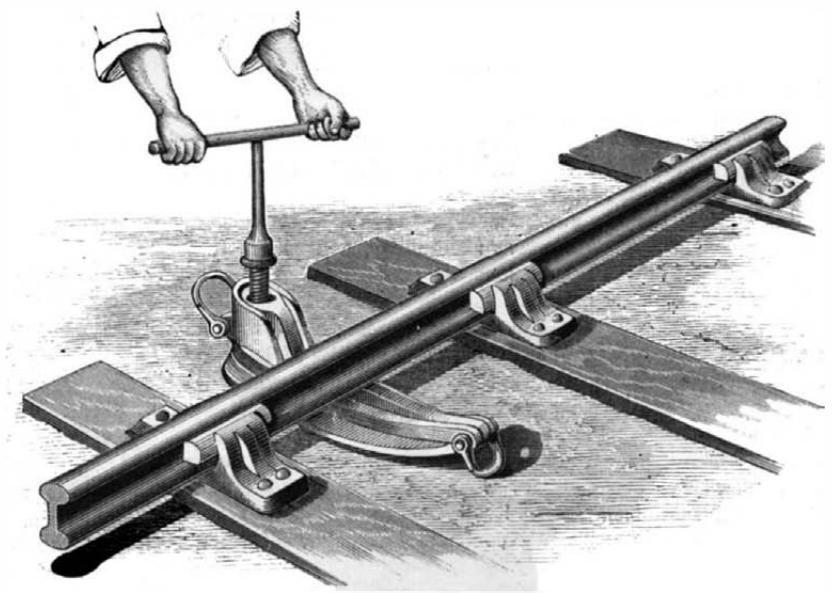
A current of common coal gas is highly carbureted, close to the point of combustion, with the vapor of naphthaline, and is then ignited with oxygen in something like the usual double blow pipe arrangement; the flame being directed against a refractory block. The light is produced by the incandescence of the carbon in the gas, which gives a warmer tone than lime or magnesium. It is continually being deposited upon the block of lime, which it protects, and aids in eventually transforming into a kind of hard porcelain. The blocks preferred by M. Helouis are made of fat lime, steeped in hot paraffine to preserve them from injury before being placed in position for use. The oxygen is obtained by means of a special arrangement, also patented by M. Helouis; the source of supply being sulphuric acid subjected to a red heat. The result of the decomposition of 500 kilos of sulphuric acid in this apparatus is 72 cubic meters, or 99·4 kilos of pure oxygen, 35 kilos of acid liquor, and 365 kilos of sulphurous acid. M. Helouis also obtains oxygen from air by means of an India-rubber dialyzer. It is stated that in comparison with the burner named after the city of Paris, in the photometer room of the Municipality, the Helouis burner, consuming 50 liters of gas, 42 grammes of naphthaline, and 138 liters of oxygen, gave the light of 15·6 carcels; which was equal to the illuminating power of 2,170 liters of gas in the Ville de Paris burner. Compared with the burner of the Rue du Quatre Septembre, which gave the light of 13 carcels with a consumption of 1,400 liters of gas, costing 42 c. per hour, the Helouis burner, of equal illuminating power, consumed 43 liters of gas, costing 1·3 c.; 120 liters of oxygen, costing 7·8 c.; and 40 grammes of hydrocarbon, costing 0·4 c., or altogether 10·5 c.

Softening Boiler Feed Water.

For the complete softening of boiler feed water, and the consequent prevention of scale, the *Engineer* recommends pure 98 per cent caustic soda, as sold in ten pound drums by some Lancashire alkali manufacturers. The substance in these drums is in the form of powder, and consequently there is no difficulty in weighing out the exact quantity required for daily use, which will be instantly dissolved in cold water. All that is necessary, therefore, is to put a small quantity daily into the feed water. The effect is to throw down all the salts of lime that may exist in the water, and would otherwise make scale, in the form of soft mud capable of being blown out in the usual way. Very little soda is required, a small quantity of the pure article going a long way. In ordinary cases it is estimated that about three pounds of it added to the feed water every day will keep a twenty horse power boiler perfectly clean and free from scale. In order to ascertain the exact proportion, it is recommended to add one-sixteenth part of an ounce of the caustic soda to a gallon of the feed water, and boil it. When the sediment thereby thrown down has settled, the clear water is to be poured off, and another half drachm of the soda added. If the water remains clear, the first addition of soda has removed the lime; but if it becomes muddy, the second allowance is necessary. In this way, remarks our contemporary, a sufficiently accurate estimation of the quantity of pure soda required can be made, and the proportion to be added to the feed water can be adjusted in the same proportion Thus, if half a drachm of soda will soften a gallon of water, there will be used about 4 pounds to 1,000 gallons. The cost of 98 per cent caustic soda is about 2d. per pound; and hence the cost of perfectly softening the water in this instance would be 8d. per 1,000 gallons—a small expense in comparison with the benefit of having no boiler scale.

THE DE BERGEN RAIL LIFTER.

One of the most useful labor-saving implements for railroad making and repairing we have seen seems to be the rail lifting device shown in our engraving. The implement is so simple, both in construction aud operation, and our cut shows it so clearly, that no description seems necessary. The *Iron Monger* (London), from which paper we reproduce the engraving, says the machine is so light that one man can carry it about with ease, place it in position under the rail to be lifted, and, unaided, raise the rail to the required height, and when the rail has been raised he can leave the lifter without the attendance of any one. When placed under the rail the lifter in no way intercepts the platelayer's view. One man with this little machine can wrench up the rail, chairs, sleepers, and ballast without first opening out the ballast in the usual manner, or he can raise heavy crossings with the same facility.



A PRACTICAL RAIL LIFTER.

A Milling Engine.

The Jewell Milling Company, Brooklyn, N. Y., have introduced the roller process into their new mill on Fulton Street, with an entire new power plant; the engine being of a new and artistic design, of the compound horizontal type, built by Wm. Wright, of Newburg, N. Y. It is rated at 550 horse power, making 60 revolutions per minute, with an initial pressure of 80 pounds per square inch.

The high pressure cylinder is 26 inches diameter and 48 inches stroke, with steam and exhaust chests on opposite sides of the cylinder, with vertical action gridiron valves—balanced—a variable valve gear, trip cut-off, and dash pot stops.

The low pressure cylinder is 46 inches diameter, or three times the area of the high pressure cylinder, and 48 inches stroke. This cylinder has a single steam and exhaust chest, with double horizontal action gridiron valves, worked directly from the eccentrics, the cut-off valve being adjustable and operated by an index screw working upon a stem passing through the steam chest.

In the steam connection between the two cylinders is a receiver or drum of the same capacity as the high pressure cylinder.

The air pump is located beneath the floor, is double acting, and worked from a rock shaft, which is connected with an eccentric upon the main shaft.

The pistons are connected to disk cranks set at right angles upon the main shaft, which carries a flywheel pulley, 50 inches in width and 20 feet in diameter, over which runs the 48 inch leather belt recently described in this journal.

The manner of locating and connecting the pipe work is rather unique for this class of engines, the steam and exhaust pipes, receiver, air pump, and condenser, as well as the double system of injection pipes, being all hidden beneath the main floor of the engine room. The main valves are operated by wheels set upon finished standards in the space between the cylinders. The only pipe work seen in the engine room are the indicator connections and the drip pipes and valves, which are highly finished and nickel plated. All of the rough parts of the frame are japanned black, with just enough ornamentation to give the whole a high and artistic finish, which is also carried out in the design and finish of the room.

The arrangement of the valve action and their set, has been made with a regard to the smoothness of action of the engine, rather than for a technical card of fine spun curves.

The initial pressure, starting at 80 pounds, is cut off to regulate the exhaust pressure at about 5 pounds, or so as to keep a nearly uniform pressure of 5 pounds in the receiver; thus giving steam to the low pressure cylinder at 5 pounds pressure, and allowing it to follow the piston in this cylinder just long enough to make the equalization in the receiver a constant pressure (which is regulated by the cut-off adjustment alluded to above), when the condenser takes the exhaust, giving a constant vacuum of 27 inches.

An unusual electric phenomenon is developed in this engine room by the action of the great belt, which is in itself quite a wonder.

The stream of atmospheric electricity, a foot in length, is so enormous in quantity that persons standing upon the floor without insulation, with their fingers stretched toward the belt, become instantly charged, as a Leyden jar, while an odor of ozone pervades the whole room.

Steam is furnished by three boilers of the cylindrical tubular type, each 66 inches diameter, 16 feet long, with Steele's revolving grate bars, the application of which brings into use a novel feature in the method of working the fires, thereby avoiding the necessity of slicing or of using the fire irons at all; the doors being only opened for the purpose of passing in coal, thus enabling an easy and continuous run of 144 hours per week without cleaning the fires.

Treatment of Ulcers.

Dr. J. Whitson, in "Notes on the Treatment of Ulcers" (*Practitioner*, January, p. 20), remarks that the application of a specially prepared sand to granulating sores has been tried for some time with success, and that it possesses the advantage, since it absorbs the discharge, of seldom requiring removal, so that healing can proceed without interruption. This sand is prepared as follows: It is first heated to a temperature capable of destroying all organic particles. It is then soaked in a solution of 1 part of bichloride of mercury in 1,000 parts of water. After this the mixture is placed in bottles and can be used when required. This mode of treating ulcers is not new, the sandy earth of the termite ants having long been used for this purpose by the natives of the West Coast of Africa. This substance was some time since imported by Mr. T. Christy, under the name of "termite earth," for trial in this country, but whether it possesses any antiseptic properties derived from the white ants is not known.

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THE MANUFACTURE OF ENGINES, SAW MILLS, AND GRAIN SEPARATORS.

In the picturesque and historical Cumberland Valley, under the shadow of the Blue Ridge Mountains, in eastern Pennsylvania, lies the busy town of Waynesboro, the home of one of our most important industries. We refer to the extensive business of Frick & Company, which had its beginning in the year 1848, the present general superintendent being at that time engaged in the manufacture of threshing machines and agricultural implements in a small country shop near Waynesboro, and in the autumn of 1850 he built from his own patterns and for his own use his first steam engine, a two-horse power.

From this humble beginning the industry grew, the facilities were increased, and in due course the business was removed to its present location, where subsequently a company was organized, and extensions, changes, and improvements were effected from time to time, according to the demands of the business. At present the condition of the company is more promising than at any time during its long and successful career. The capital has been increased and working facilities extended, and still the demands upon the concern are such as to make it difficult to meet the business offered with entire satisfaction.

At the close of last year $300,000 was added to the capital, placing the company in an easy financial condition. Extensive additions are now being made to the works, and the number of expert mechanics is being constantly increased.

From its foundation the business management of the company has devolved upon Mr. George Frick, who, though advanced in years, continues to pay close attention to it, and while he has associated with himself a large and capable body of assistants, the present successes of the company are as largely due to his constant presence and supervision as was the origin of the business to his ingenuity and unusual mechanical skill.

The aim of the company has been to produce machinery which would yield the best possible results at a price consistent with permanence and durability. That these objects have been attained is forcibly shown in the widespread popularity and the ever increasing demand for their productions. A better proof than this of the merits of their goods could not be given.

It is worthy of record, that since the commencement, the works have not been stopped for want of business, having been kept constantly engaged even through the period of depression which this country experienced after the financial disturbances of 1873. Indeed, for the last five years or more, excepting only when occasionally shut down for repairs, they have run on extra time, amounting in the average to thirteen hours out of the twenty-four. The extensive and constantly increasing application of steam as a motive power for agricultural and other purposes has led them to pay especial attention to the production of an engine made on the highest scientific principles, original in design, strong, powerful, and durable, and this claim to excellence seems to be well founded.

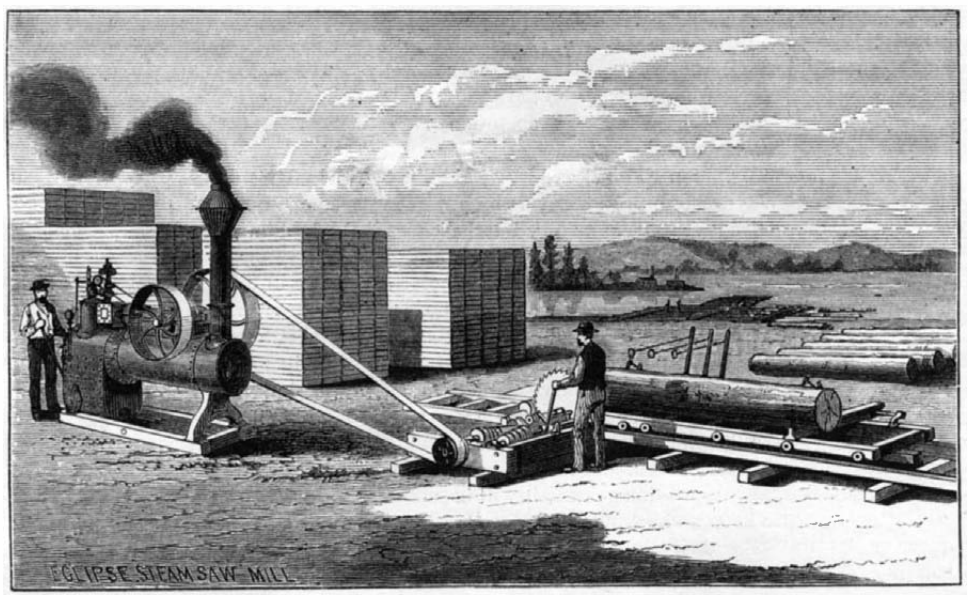
At the International Centennial Exhibition of 1876, the judges found, after minute examination, "that the 'Eclipse' farm engine gave the best results of any that were tested." We quote the above from the report of the award; the highest honors that could be awarded were accordingly bestowed upon Frick & Company's engine.

In the summer of 1880, an engine was shipped by them to Australia for exhibition at the exposition then in progress at Melbourne, and there their engine was recommended for the first award and gold medal of honor. This was a noteworthy victory, the contest being unusually severe and the competition great, as at this exhibition there were twenty-five farm engines from England and other countries competing for the distinguished honor thus captured by an American manufacturer.

The highest awards offered are usually taken by this company when competing for honors, and the last distinction paid their engine was in October last, at the St. Louis Fair, where they earned the first award of $100 in gold over fourteen competitors.

The factory, as shown in our engraving, is, as a whole, an elegant and imposing brick structure, and its equipments are unsurpassed: each department is conveniently arranged for the proper prosecution of its particular business, and the machinery and small tools employed are of the latest and best designs.

While it is impossible to convey a full and just idea of the magnitude and completeness of these works, something can be learned from the dimensions of the buildings, which we give below:



FRICK & CO.'S PORTABLE SAW MILL.

Machine shop, 2 floors	56 x 300 each.
Foundry	50 x 120
Smith shop	50 x 120
Boiler shop	90 x 120
Wood	100 x 120
Pattern, 2 floors	90 x 180 each.
Paint	45 x 90
Storeroom, 2 floors	30 x 50 each.
Testing shop	40 x 50

The total floor area, including storage and other buildings not shown above, is over 100,000 square feet.

The view in the center of the group on our title page shows the extensive and systematic arrangement of the shops, eleven in number, which, together with ample and substantial sheds, reservoir, force pump house, and stables, cover an area of over eight acres.

The office, seen in the foreground of the engraving, is commodious and admirably arranged for the requirements of the business, and although isolated from the buildings, communication is had with each department of the works, and with the bank and business centers of the town, either by telegraph, telephone, speaking tubes, or a system of steam signals with which the works are provided. West of the offices will be seen the pump house and reservoir, and in the former is located a large duplex Worthington steam pump, and a boiler in which fire is kept constantly. Connected with the pump is a complete system of water mains, hydrants, and coils of hose, which, with a body of men trained for the work, constitutes an efficient fire department. The reservoir is supplied from the west branch of the Antietam, which flows within a short distance of the works, and on the banks of which is located a second pump house and pump.

In the machine shop are employed two hundred hands, each being skilled and practiced in his particular work. This shop, as well as all the others, is furnished with the electric light, and with facilities for handling work with ease and economy. About half-way down the machine shop is located the office occupied by the master mechanic, together with the tool room, below which is a space devoted to the erection of machinery, as shown in one of our engravings. The basement of this entire building is used as a store room for all the numerous castings used in the business, which are so classified as to be readily accessible.

Beyond the erecting shop is an area used for temporary storage of finished work. From this point it is loaded on cars running on a sunken track, and on opposite sides of this track stand the testing shop and store house. This is a very convenient arrangement for the reception and shipment of goods. All engines and boilers are run into the testing shop for examination and trial. The store house is a large two-story building, containing all classes of small finished work, whether made at the factory or purchased elsewhere. Seven buildings are seen in the engraving, with their ends parallel to and separated from the machine shop by a railroad track.

The first of these is the foundry, which contains two cupolas, each of ten tons capacity, also cranes, core ovens, and the customary appurtenances of a well equipped shop of this character.

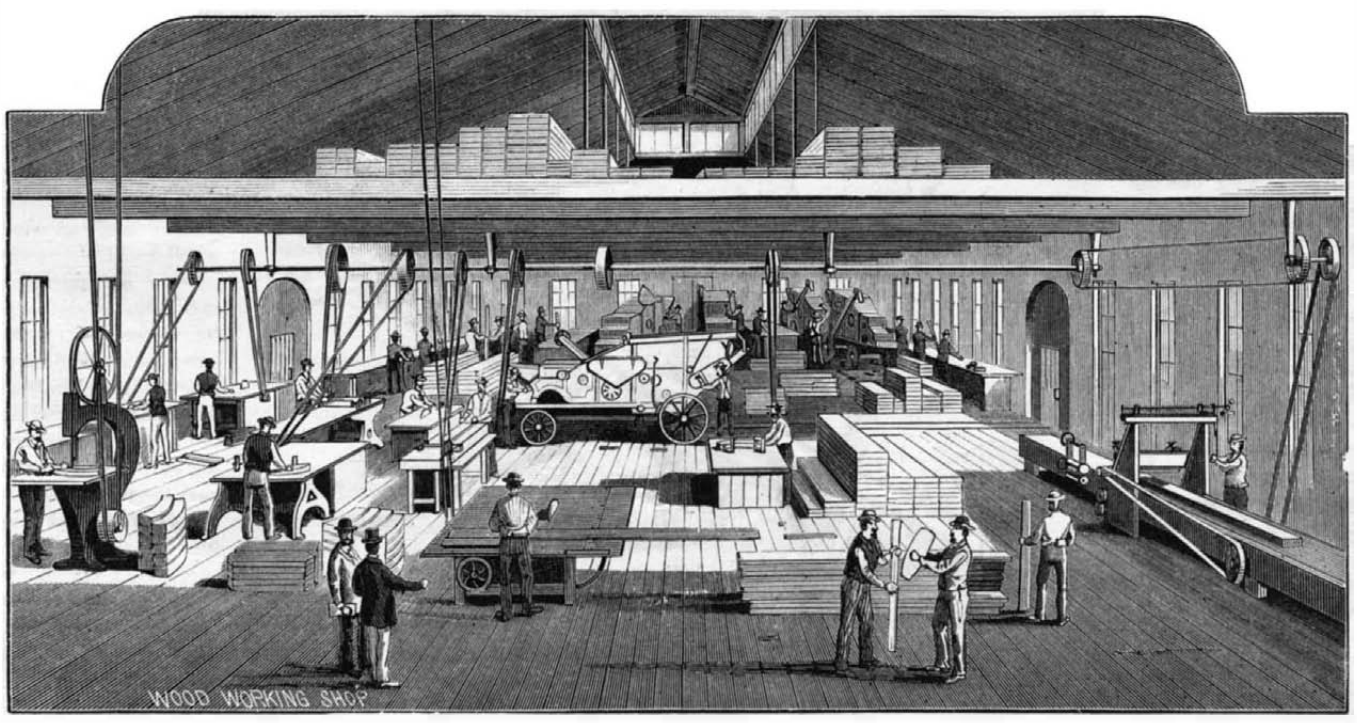
The next building contains an 80-horse power horizontal engine—an excellent specimen of the company's work—the dynamo machine, pumps, blower, etc., and the boilers, two of 80 and one of 50 horse power, and the brass foundry. Under this roof we also find an apartment in which castings are cleaned, also an artesian well, and at the end of the building there is a wheel and spoke shop.

Beyond this building stands the pattern shop, which is not shown in the engraving. It is a fine and roomy two story structure, combining office, shop, and store house. Here is also the flask shop.

Next in line with the engine and boiler house is found the smith shop, containing twenty fires, steam hammers, Webb's revolving bolt furnace, and a large bolt header. The next building is the boiler shop, having forges, shears, punches, steam riveters, and rivet heating furnace. A hundred men are here employed, and the work of the shop averages about twenty boilers per week, ranging in capacity from 2-horse power to 200-horse power.

At the further end of this building a series of racks is arranged for the reception of boiler iron, and the building is provided with a system of tracks and turn tables to facilitate the handling of materials.

In the wood shop, which is next, the company's well known "Waynesboro Eclipse" grain separator and thresher, and their portable saw mills are made. An interior view of this building will be found in the illustration.



FRICK & CO.'S WOOD-WORKING SHOP WAYNESBORO, PA.

The next in order is a long metal roofed building, in which are stored portable and traction engines, saw mills, threshers, and horse powers, and beyond this is located the paint shop and drying kiln adjoining the extensive lumber yards of the company.

The buildings are of very tasteful design; they are all constructed of brick and have slate roofs; each building is separate from and independent of the others, and a system of tracks runs through the entire works to facilitate the handling of heavy machinery and material.

Some idea of the capacity of the works can be formed when it is stated that during last year they turned out very nearly a thousand engines alone, to say nothing of the boilers, horse powers, grain separators and threshers, and saw mills, which they make in great numbers. Five to seven hundred men here find constant employment, and the works are being extended for the accommodation of a still greater force.

The company's great specialties are the "Eclipse" trac

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tion and portable engines, the latter being built both on sills and wheels. This engine is so widely and favorably known as to render a detailed description superfluous. The popularity of the "Eclipse" traction engine has grown out of its great success in accomplishing the work for which it was designed, and in many important features it is a decided departure from its class. Much care and attention has been given its construction, with a view to overcoming the many difficulties which are experienced in the successful propulsion of a traction engine when hauling heavy loads through a rough and uneven country. The engine proper is mounted on the crown of the boiler, but is fastened to it at the cylinder end only by an expansion joint, the other or crank end with its gearing connections being secured to and supported by wrought iron side plates riveted to the frame or sills of channel iron that extend partly along each side and under the boiler to the front axle. The smoke box end of the boiler is carried in a saddle, on which is cast an arm or bracket supporting the ends of the frame. Within this saddle casting the fifth wheel, or king post, for the front axle revolves, the axle being partially covered by a casting with two spring chambers, thus relieving the front end of the boiler of shocks while passing over a rough road. The sills are well braced together. The fire-box end of the boiler is carried in a saddle or wrought iron band riveted to the sills, and by this arrangement it will be seen that allowance is made for boiler expansion without transmitting any strain to the frame, engine, or gearing.

Two styles of traction engine are built in three sizes, the styles varying to suit different sections of the country. One is made with powerful springs under the main or driving axle in connection with a universal coupling in the countershaft, to allow for rocky and uneven roads, the other without these springs and flexible countershaft for flat or prairie country.

The power in all cases is transmitted from the engine to the traction wheels through an ingenious patented elastic spring connection and compensating gear, which allows one traction wheel to rise vertically without straining the gearing and connections, and by a novel locking device in the hub of one traction wheel, both wheels can be locked upon the axle when passing over a slippery road. By excellent mechanical arrangement, the weight of the engine and gearing is concentrated over the driving axle, thus greatly increasing the tractive power.

The traction wheels are of excellent design, light in appearance, with spokes and fluted rims of wrought iron and hubs of cast iron. The axle, made of the best forged cast steel, is very large and heavy, and has long bearings, and throughout the engine provision has been made to secure bearings as large as possible. A powerful brake is used upon this engine, by which its momentum can be controlled sufficiently to bring it to a standstill within its own length. Another peculiarity of this engine is the high rate of speed of which it is capable. The advantage of this is apparent when the engine is employed in hauling a thrashing outfit from one job to another. Much time is thus gained over an engine that is capable of making but slow progress with its load, or, where the roads are unfavorable, can scarcely haul itself. Owing to its peculiar construction, the "Eclipse" traction engine gives this additional speed without increased cost.

The patent steering mechanism of this engine consists of a shaft supported between the sills in front of the fire-box, on which is wound a chain carried to each side of the front axle and having elastic links inserted in it, so that no shocks are conveyed when the front wheels strike obstructions. The chain shaft is operated from the platform by a standing shaft with worm and worm gear.

It is a great convenience to the engineer when running to have the throttle, reverse motion, blower, brake, steering wheel, pump, injector, fire and ash pit doors, whistle, and all bearings within easy reach. These engines are furnished with a water tank under the platform and coal boxes upon it, or with a two or four wheeled tender attached to the rear of the platform, while in some cases the water tank is carried upon the sills under the boiler and forward of the fire-box, and the crown sheet is so designed as to be always under water when going up or down hill.

The "Eclipse" portable or agricultural engine, of light and graceful design, is mounted on strong wheels, with boiler high enough above the ground to allow the front truck to make a very short turn, which is an especial advantage. The engine proper, of the well known "Eclipse" pattern built by this company, is simple and compact. Its design is the result of years of practical experience in meeting the wants of a large number of users. It is attached to the crown of the boiler by expansion joints and bolts in such manner as to equally divide the weight between the forward and rear axles. Special claims are made for improved methods of mounting the boiler so as to relieve it of all strain. Instead of passing the rear axle through the fire-box, as is customary with many builders, it is carried under the fire-box and up through improved spring-chambered brackets, bolted securely to each side of the fire-box. The weight of the boiler and engine is carried by two iron rods passing under the fire-box, one on each side of the axle and extended upward through caps that cover the brackets and against which the springs bear; in turn the axle bears against these springs, relieving the boiler and brackets of all strain consequent upon carrying the weight upon them, as is usually the case, and thus loosening of the bracket bolts and leakage is prevented.

The springs are accessible by simply removing the nuts on the rods and lifting off the cap. Each bracket is furnished with a set screw to bear against the axle when running the engine, thus preventing vibration. The front axle is also provided with springs, insuring safety and ease of transportation, and preventing shocks to the boiler and engine.

The boiler and engine just described are also furnished securely mounted on substantial frames or sills, as seen in the cut showing the portable sawmill.

The company also manufactures stationary engines and boilers of all sizes, grain separators and threshers, horse-powers, circular sawmills, mill gearing, and the customary adjuncts of an engine factory.

Situated in the midst of the iron and manufacturing regions, Frick & Co. have all possible advantages in the selection of material, and as their works are reached by three railroads, two of which connect with the Pennsylvania and Baltimore and Ohio systems respectively at a short distance from Waynesboro, it will be seen that they have every facility for the favorable operation of a business of the character described.

Mr. John Philips, cashier of the First National Bank of Waynesboro, presides over the affairs of the company. His office is elective annually, but has been held by him since 1873, in which year the company was organized.

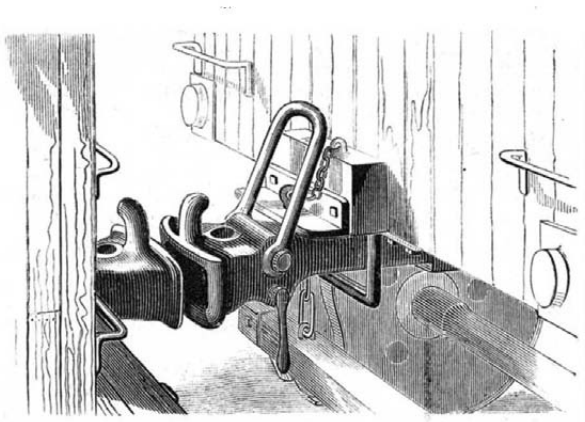
Like most of the large concerns of the day, it will be seen that the firm of Frick & Co. had its small beginnings. Its present unparalleled reputation is but the natural outcome of intelligent, persistent, honest effort exercised by its management, the merits of their productions, and by making quality their first great consideration.

With the fairest of reputations, and an adequate capital at their command, and their determination to maintain the advanced position gained, it will be no difficult task for them to keep at the front.

For their illustrated catalogue or for further particulars, address the manufacturers at their head office, Waynesboro, Pa.

IMPROVED CAR COUPLING.

The engraving shows an improved car coupling recently patented by Mr. E. S. Graver, of 209 N. Front St., Philadelphia, Pa. This improvement consists, essentially, of a loop or U-shaped link pivoted to one draw bar, in combination with a horn on the other draw bar, with which the link engages by swinging down over the horn, together with a latch device for holding up the link when uncoupling, and a device for supporting the link in an inclined position preparatory to coupling. This device is simply an L-shaped



GRAVER'S CAR COUPLING.

plate of iron secured to the end of the car, and which throws the link down over the horn and coupling by the recoil of the draw bar when the cars run together. This simple and efficient device may be used, together with the ordinary coupling link and pin, on cars of any kind and of different heights. It will couple cars on a curved track, and it may be applied to cars one at a time if necessary, without interfering in any way with the use of the new or old coupling. By the use of this invention the dangerous practice of going between the cars to couple them may be avoided.

American Locomotive Fireboxes.

At a recent meeting of the Institution of Civil Engineers, London, the paper read was "On Mild Steel for the Fireboxes of Locomotive Engines in the United States," by Mr. John Fernie, C.E.

It was stated in the paper that the use of mild steel for the fireboxes of locomotive engines was now general in the United States. Although large numbers of the outer shells of the boilers were still made of iron plates, this was simply to effect a saving of expense, and many railroad companies had the boilers wholly of steel. Iron plates were first used as a substitute for copper, owing to the rapidity with which the anthracite coal wore away the soft copper. When sound the iron plates gave better results, but the weldings were frequently unsound; they were apt to blister, and the plates were subject to crack near the firebars.

Steel fireboxes, the plates being a nearly pure compound of iron and carbon, were used for the Pennsylvania Railroad engines eleven years ago. Since then, excellent steel for this purpose had been made by the Siemens-Martin open hearth process in many places in the United States. The mode of manufacture of this steel was briefly described, as it differed from English practice. The specification for boiler and firebox steel last given out by the Pennsylvania Railroad Company was quoted. The author next proceeded to state that in the cities of the United States, all steam boilers for stationary engines were placed under municipal regulations, whereby a proper registration and inspection were instituted at a small cost to the user.

In Philadelphia about 4,000 boilers were tested once a year, and a license was given by the inspector to use the boiler for one year, at the pressure it was considered fit to sustain. The formulæ under which the calculations were made were stated, and the tests employed. The highest test was when a boiler plate, from which a portion was cut off lengthwise, showed a ductility of 20 per cent upon a measured length of twelve thicknesses of the plate, and when cold would bend to 180 deg., over a diameter equal to two thicknesses of the plate, or when cut crosswise would bend cold to 90 deg., over a diameter equal to five thicknesses of the plate.

In every steam vessel navigating the lakes, rivers, and seas of the United States, and sailing under its flag, a complete system of inspection during manufacture, and an examination of boilers when made, was maintained by the Government, and all boiler plates had to be branded with the maker's name, and with the tensile strength of the plate per square inch. Makers of boiler plates were pecuniarily liable for any failure of the material, if it occurred at a lower strain than that with which it was branded. Officers for examining and testing the materials and work done were appointed, and the question seemed to be much better understood and practiced in the United States than in England.

With respect to locomotive engines, which were in one city one day, and in another on the next, and which might constantly be moved out of one State into another, there could be no municipal or Government control, but there was a healthy public opinion on the subject, and heavy damages would be obtained against any company whose boilers exploded from neglect, or from the use of bad material. In America, it was stated, railroad engineers were not hampered by Government control. There was no necessity to urge railway companies to adopt improvements. Inventions were quickly examined, tested, and rejected or adopted. Hence the march of improvement was more rapid than in Great Britain.

The author then proceeded to describe, first, the English type of locomotive firebox, and afterward the various new forms of American fireboxes. In the former the strains set up by the greater expansion of the inner box over the outer, from the higher temperature, were aggravated from the material being of copper, which expanded more than iron under equal increments of temperature. Greater stress was thrown upon the stays, and by the use of copper and brass tubes a galvanic action was established in locomotive boilers, which speedily destroyed the iron plates.

The author illustrated the American type by two examples of boilers and fireboxes in use on the Pennsylvania Railroad, and he pointed out in how far they approached the conditions of what he held to be a perfect firebox of the old and well known form. The requirements for a firebox of this kind were: that the plates forming the outer and inner boxes should be of similar metal; that as the metal of the inner box must always expand more than the outer, it should be thin enough to bend or spring between the spaces where it was held by the round stays; that to compensate for the extra expansion, the heavy roof beam stays should be done away with; that there should be a number of water tubes through the body of the firebox, that the firebars should also be water tubes, that the areas of the firebox and grate should be large, and that the materials of construction should be cheap and easily obtainable.

The author demonstrated that in these respects the American was far in advance of the English type of locomotive boiler. With regard to cost he showed that as steel fireboxes were only half the weight of copper ones, and as the price per ton of the former metal was about one-third of the latter, the actual cost of steel fireboxes was from one-fifth to one-sixth the price of copper ones, although the cost of workmanship would be a little more in working steel.

A New Copper-Zinc Alloy.

Engineering says that Mr. Alexander Dick has succeeded in producing a new copper-zinc alloy which exhibits characteristics as essentially superior to brass as those of bronze are to gun metal. The advantages claimed for the new alloy, which has been named "delta metal," are great strength and toughness, and a capacity for being rolled, forged, and drawn. It can be made as hard as mild steel, and when melted is very liquid, producing sound castings of close fine grain. The color can be varied from that of yellow brass to rich gun metal; the surface takes a fine polish, and when exposed to the air tarnishes less than brass. These latter characteristics will meet with ready appreciation for cabinet work, harness fitting, etc. The metal when cast in sand has a breaking strain of 21 to 22 tons per square inch; when rolled or forged hot into rods, the breaking strain is 43 tons per square inch; and when drawn into wire of 22 B.W.G., of 67 tons per square inch.

Results of New Inventions.

Mr. Edward Atkinson, illustrating the advantage of machinery, says it would require sixteen million persons, using the spinning-wheel and hand-loom of less than a century ago, to make the cotton cloth used by our people, which is now manufactured by one hundred and sixty thousand.

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Correspondence.

Flying Machines.

To the Editor of the Scientific American:

The correspondent who writes about "flying machines," on page 117 of the present volume, has hit the keynote exactly. When the power of a man's lower limbs can be utilized toward flying, there seems to be strong indications of the difficulty being mastered and flying made a thing not impossible. L. W.

Curious Snowballs.

To the Editor of the Scientific American:

I notice in your paper of March 3, an account of some curious snowballs (evidently wind formed) which were seen at Merrow Station, Conn., on February 21.

On the surface of the frozen Hudson River there were on the same date thousands of these snow cylinders. They can best be compared to rolls of cotton batting. The largest were about one foot in diameter. The zigzag furrows showed that they had traveled in a northeasterly direction. In the afternoon the larger cylinders became hollow, being then more like muffs in appearance than like rolls of cotton batting.

No one here seems to have taken the trouble to notice these snowballs; and it seemed to me that a record of such a phenomenon was noteworthy, if only as a corroboration of your Connecticut correspondent.

March 5, 1883. HENRY BOOTH.

Wind Snow Balls.

To the Editor of the Scientific American:

While reading the account of a "Storm of Snowballs," by J. M. Merrow, in your last issue, I was reminded of one like it which occurred here on March 4, 1881, which I copy from my journal of that date. A man came with a load of coal, and while unloading, the horse became frightened at something and I took hold of the bit to quiet him, and I noticed he looked over in the lot with his ears up. I looked the same way, and was considerably startled myself.

The day before was cold (20° F.) and formed a crust on the snow. In the night the wind changed from northwest to southeast, with a fall of two inches of light snow, and the mercury rose to 33°. The wind rose to a gale shortly after sunrise, and blowed lumps of snow off the fences, trees, etc., rolling them along over the damp snow, growing larger as they advanced until they were too heavy for the wind to move. One of these near the fence was what the horse saw. What a grand sight it was! As far as we could see from an upper window, the fields were covered with rolls from the size of an egg up to twenty inches in diameter and forty inches long by actual measurement, and some were a great deal larger where they rolled down a hill by their own weight.

They were all in the form of a cylinder with conical cavities at each end nearly meeting in the center, the distance varying with the size of the nucleus. A strong south wind and higher temperature destroyed most of them before night.

We had another storm of snow rolls on January 12, 1882, the largest measuring twelve inches in diameter. The wind west, temperature 36° F.

Rome, N. Y., March 4, 1883. W. S. VALIANT.

Kangaroo and Opossum.

To the Editor of the Scientific American:

In the SCIENTIFIC AMERICAN of February 3 (page 69), Professor H. N. Mosely, in his "Challenger Notes," claims that the young kangaroo and opossum do not grow out of the teat of the mother's pouch. I lived in Queensland for some years, and can confidently state that they do. I have killed opossum with the young attached to the teat inside the pouch, when it was perfectly devoid of hair, and not measuring over one inch, perfectly blind and its head the largest part of it, and the mouth of the pouch so small that I could hardly insert the point of my little finger, and have seen the same on all kinds of kangaroo. It is hardly likely that the mother would, after having given birth to its young in the ordinary way, place its young in the pouch, and that a young one of that size would then attach itself to a teat so firmly that it is impossible to remove it without killing it.

February 10 issue of SCIENTIFIC AMERICAN, "Aerial Navigation." I would also like to state that I have killed albatross, measuring 15 feet 7 inches from tip to tip of wing, and many of them over 13 feet. The particular albatross that I mention was killed by myself during a voyage to Australia on board a British bark named the Alfred Hawley in 1864, about 700 miles south of the Cape of Good Hope.

R. G. D.

Vegetable Substitutes for Rennet.

To the Editor of the Scientific American:

My attention has been called to an article in the SCIENTIFIC AMERICAN (February 24) headed "Vegetable Substitute for Rennet," by Sir J. D. Hooker, from the Kew Report. It is represented in the article that a good vegetable rennet is a desideratum for making cheese, such as the ryots of India could find salable among a people who would not use cheese made with ordinary rennet.

If the discovery of a vegetable substance, having the property of rennet required in cheese making, would be of any importance, it would be desirable to have a knowledge of other sources, from which the substance may be obtained besides the one brought into notice by Sir J. D. Hooker—*Puneeria coagulans*—especially as this plant requires an apologist to vindicate it against the suspicion of being poisonous. Now, that large natural order, the *compositæ*, which comprehends about one-ninth of all flowering plants, furnishes several species that invite examination. But it suffices to mention a few of them, well known not to be poisonous. Indeed two of them are garden vegetables very generally cultivated. These are *Cynara scolymus* (garden artichoke) and *C. cardunculus* (cardoon). Besides these esculents, there are several species of *Cirsium* (common thistles), *e. g.*, *Cirsium discolor*, and *C. lanceolatum*. The parts of these plants of which I can speak from my own observation are the florets. When the involucrum has expanded sufficiently, if the group of florets is pulled off from the receptacle, and rubbed, so as to bruise them, on the inside of a dish, fresh milk poured into that dish will coagulate* in a short time without becoming acid. If the milk be previously prepared to the taste, the result of coagulation is a palatable and wholesome article.

Is not the above stated property of these plants enough to warrant further experiments on them in quest of a vegetable rennet?

WM. JOHNSON.

Rolla, Missouri, February 27, 1883.

American Manufacturing Interests.

The following table from the Census Bureau shows the capital invested and the value of products of all the establishments of manufacturing industry, gas excepted, in each of the States and Territories, as returned at the census of 1882:

	Number of establishments.	Capital.	Value of products.
Alabama	2,070	$9.668,008	$13,565,504
Arizona	66	272.600	618.365
Arkansas	1,202	2.953,130	6,756,159
California	5,885	61,243,734	116,218,973
Colorado	599	4,311,714	14,260,159
Connecticut	4,488	120,480,275	185 637.211
Dakota	251	771,428	2,373,970
Delaware	746	15.655,822	20,514,438
Dist. of Columbia	971	5,552,526	11,882,316
Florida	426	3,210,680	5,546,448
Georgia	3,593	20.672,410	36,440,948
Idaho	162	677,215	1,271,317
Illinois	14,549	140,652,066	414,864,673
Indiana	11,198	65,742,962	148,006,411
Iowa	6,921	33,987,886	71,045,926
Kansas	2,803	11,192,315	30,843,777
Kentucky	5,328	45,813,039	75,483,377
Louisiana	1,553	11.462,468	24,205,183
Maine	4,481	49,988,171	79,829,793
Maryland	6,787	58,742,384	106,780.563
Massachusetts	14,352	303,806,185	631,135,284
Michigan	8,873	92,930,959	150,715,025
Minnesota	3,493	31.004,811	76,065.198
Mississippi	1,479	4,727,600	7,518,302
Missouri	8,592	72,507,844	165,386,205
Montana	196	899,390	1,835,867
Nebraska	1,403	4,881,150	12,627,336
Nevada	184	1,323,300	2,179,626
New Hampshire	3,181	51,112,263	73,978,028
New Jersey	7,128	106,226,593	254,380,236
New Mexico	144	463,275	1,284,846
New York	42,739	514.246,575	1,080.696,596
North Carolina	3,802	13,045 639	20,095,037
Ohio	20,699	188.939,614	348,298,390
Oregon	1,080	6.312,056	10,931,232
Pennsylvania	31,232	474,510,993	744,818,445
Rhode Island	2,205	75,575,943	104,163,621
South Carolina	2,078	11,205,894	16,738.008
Tennessee	4,326	20.092.845	37,074,886
Texas	2,996	9,245,561	20,719.928
Utah	640	2,656,657	4,324,992
Vermont	2,874	23,265,224	31,354,366
Virginia	5,710	26,968,990	51,780.992
Washington	261	3,202.497	3,250,134
West Virginia	2,375	13.883,390	22,867,126
Wisconsin	7,674	73,821.802	128,255,480
Wyoming	57	364,673	898,494
The United States	253,852	$2,790,272,606	$5,369,579.191

NATURAL HISTORY NOTES.

Use of the Saw in the Sawfish.—In presenting the beak of a sawfish (*Pristis*) from the Lake of Bay, Philippine Islands, Dr. S. Kneeland, at a recent meeting of the Boston Society of Natural History, suggested a use for this toothed projection which seems more reasonable than the ones usually given; namely, that it is an instrument for more or less horizontal insertion in the mud or sand of shallow water, and which, by a vigorous sweep of the long, upper lobed shark-like tail, is quickly pulled out backward. The lateral teeth are sharp edged in front for easy insertion, but concave behind to offer resistance and more thoroughly stir up the bottom. This action is doubtless accompanied with a series of short, horizontal movements of the anterior part of the body. The mouth is small underneath, and provided with pavement-like teeth, as in the rays, adapted for crushing mollusks, crustaceans, and hard-cased creatures on which it feeds. Dr. Kneeland thinks the stories of its attacking the smaller cetaceans in open sea are due to errors of observation arising from confounding the saw fish with the sword fish (*Xiphias*). He further believes that its weapon, mouth, teeth, habits, and habitat cannot be reconciled with the active carnivorous propensities usually ascribed to it. Ray-like, it is a bottom feeder, with crushing, not tearing, teeth. The snout is too blunt for piercing, and the lateral teeth would offer an obstacle thereto rather than an advantage.

Sudden Destruction of Marine Animals.—In the *Geological Magazine*, Professor T. Rupert Jones accounts for the manner in which large numbers of marine animals have, in past ages, suddenly perished in their own element and become entombed: 1. (fishes) by either unusual or periodical influx of fresh water from the land; 2. by volcanic agency; 3. by earthquake waves; 4. by storms; 5. by suffocation, when massed together in frightened shoals, or when burrowing in sand and mud and accidentally buried by other sands and mud; 6. by being driven ashore by fishes of prey; 7. (fishes and mollusks) by too much and too little heat in shallow water; 8. by frost; 9. (fishes) diseases and parasites; 10. (fishes and mollusks) miscellaneous causes, such as disturbance of equilibrium of living and dead organisms, ferruginous springs, poisons, lightning, etc.

A Myriapod which produces Prussic Acid.—A foreign myriapod occurring in hot houses in Holland, and identified as belonging to the genus *Fontaria*, has the power of secreting prussic acid. Attention was called to this animal by its emitting a distinct odor of oil of bitter almonds when excited, and which was especially apparent when the animal was crushed. Maceration of specimens in water showed at once that the smell was due to the above named acid, this being detected in the water. A series of experiments have been made by C. Guldensteeden-Egeling to test the hypothesis that the myriapod secretes a material which, under certain conditions, is decomposed and gives rise to hydrocyanic acid as one of its products. These experiments have fully confirmed such hypothesis; for, by the use of various reagents, a body has been shown to exist which is broken up by water and yields HCy among the products of its decomposition.

Professor Cope, in commenting upon this, says that *Fontanaria virginica*, a common myriapod in Pennsylvania, has long been known to emit a powerful smell of prussic acid.

The Ancestors of the Dog.—Professor Cope in an article on the "Extinct Dogs of North America," in the March number of the *American Naturalist*, says that the origin of the canidæ is doubtless to be found among the forms of the creodonta—flesh eating animals of various degrees of power, without scapholunar bone; with well-defined canine teeth; with low type of brain, and generally imperfect ankle joint. They stand in nearest relation to the insectivora, but have points of resemblance with the marsupialia. Professor Cope originally included them as a subdivision of the insectivora, but subsequently placed them with the latter and several other sub-orders in a comprehensive order which he termed bunotheria. This view of the origin of the carnivora has since been reaffirmed by Huxley.

Fangs of the Rattlesnake.—At a January meeting of the Philadelphia Academy of Natural Sciences, Dr. Leidy exhibited a series of fangs taken from a rattlesnake fifty-two inches in length. The rapidity with which the functional fangs are reproduced was shown by the presence, on each side of the jaw, of five fangs in varying degrees of development, so placed as to replace those which are lost.

Steam Thrashers.

The farmer is getting the advantage of the inventive faculty of the present age. Steam thrashing machines are slowly but surely displacing the old method of thrashing by horse power. It takes more help to keep the machine running up to its full capacity than it did by horse power, but then a much steadier motion is given, and the much dreaded "thrashing days" are shortened by one-half, which is a great boon to the farmer and his wife. There is only one team needed, and that the thrashing men furnish themselves, and use it for hauling water for the steam engine. Where the thrashed grain has to be taken any distance, of course teams have to be used for hauling it away. The steam thrashing machines are made extra large, with a big cylinder at which two men stand to feed it. This necessitates two band cutters and an extra two men to pitch to them. These steam thrashers, combined with the improved machinery for putting the grain into the ground in the spring (we refer to the screw pulverizer) and the self-binding reaper, make the farmer practically independent of hired help, for a crop of 100 acres of small grain can be sown, reaped, and thrashed as easy as 20 acres could by the old and slower methods. This is a very important item in the farmer's economy, for in some sections help cannot be obtained during the rush of harvest at any price, and where it can be got it is generally of an inferior character and has to be paid exorbitant prices of from $2.00 to $3.00 per day. The steam thrasher is of immense benefit to the farmer, and the day will soon be here that every neighborhood will be supplied with a machine. Farmers can use the steam power that it takes to run the thrashing machine for all the necessary purposes of grinding grain, shelling corn, and cutting hay with a chaff-cutter, when the machine is not in use for thrashing.

Suitable arrangements must be, however, provided for guarding against fire. Where possible the engine should be placed far enough away from the farm buildings so there will not be the remotest chance of fire. The best way to carry this power from the engine to buildings is by a wire rope, as a belt cannot be used to carry power as far as a wire rope; and then, too, the belt, when used in wet weather, will get wet and slip.—*Breeder's Live Stock Journal.*

* No experiment has been made, as far as I am advised, with a view to determining whether the coagulation is caused by the flower or by the *achenia* which come off from the receptacle with the florets. It would be important that this point be decided.

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A NEW LIGHT.

BY LEON WARNERKE.*

This new light is the invention of Captain A. De Khotinsky, of St. Petersburg. It is an improved system of the Drummond light, viz., it is produced by heating to incandescence a refractory prism of a peculiar construction.

As in the Drummond light, combustion is produced by oxygen and ordinary coal gas; however, in the Drummond light, when streams of oxygen and hydrogen gases are directed under pressure on to the lime cylinder, it will be soon observed that a cavity is formed in the lime, necessitating either a clockwork arrangement to rotate the lime, or else constant attention to move it by hand. The shape of lime, and further the cavity formed, cause the light to be directed to a certain limited space before the apparatus. The lime itself is used up in a very short time, and is very soon rendered useless by the action of air and moisture. In the new light the novelty consists in the following:

The refractory material has the shape of a prism or pencil made of a specially prepared magnesia compound, which is unaffected by air, and is even not spoiled by water; it stands the temperature so well that, although it looks so delicate and thin, it will remain burning for 300 hours. A stream of oxygen and coal gas under very low pressure† (8 inches of water) is directed on to the axis of the prism, which becomes incandescent, and, unlike the Drummond light, it is not a point, but a line of light of about 2 inches long, and, moreover, this light radiates all round. How very steady and brilliant is the light now before you can be judged by comparing it with the full gas sun-lights, gorgeously illuminating this room. A variety of lamps are used, according to their destination, such as brackets, girandoles, table, and other forms. When coal gas is not to be obtained, it can be superseded by paraffin, spirit, or other form of lamp. In St. Petersburg, it is in use at the State Paper Manufactory, where color printing is executed on a very large scale. In the shops where colored silks and other fabrics are sold the advantage of the new white light is especially appreciated. Mr. Lewitsky has an idea of using this light in his retouching rooms, where white and steady light is of paramount importance. It can also be used for the optical lantern, which is largely used for educational purposes. The lamps for this purpose are specially constructed. The size and shape of the burners and prisms are made in great variety, so as to give light from 25 to 300 candles.

There are also some special lamps constructed for use under water by divers, also for mines, and for places where no combustible gas can be used, and for powder magazines.

These lamps are hermetically closed glass vessels, having a spirit or paraffin lamp and a small tube connected with the reservoir of oxygeu. The products of combustion partly accumulate in the shape of water in a specially reserved space, and gases escape through capillary openings which permit the passage of the gases but not of the water.

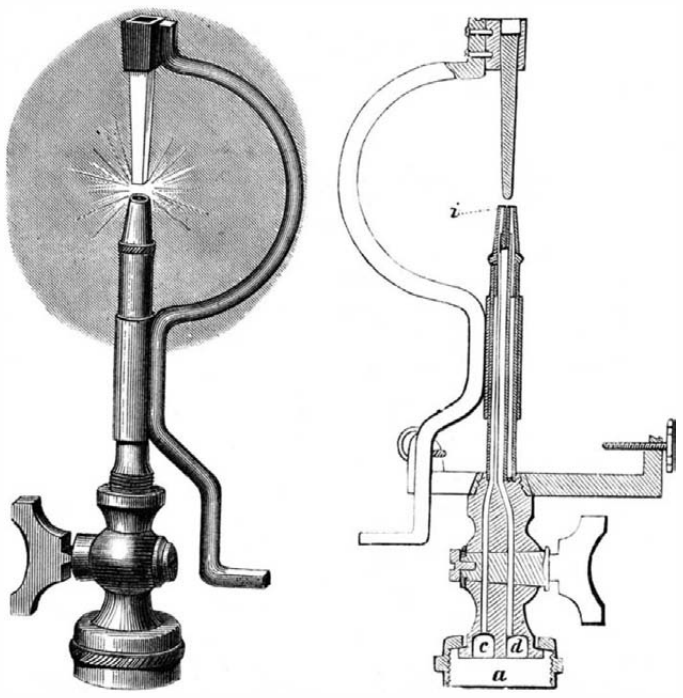
A manufactory of oxygen is, however, the foundation stone of this new system of illumination. Captain A. De Khotinsky has succeeded in perfecting the system of production of oxygen to such an extent that it will be possible, if only one small manufactory is established in London, to produce oxygen at the rate of 20.000 cubic feet daily, at a cost of 7*s.* per 1,000 cubic feet (this includes the cost of materials, 10 per cent on capital, wages, taxes, repair of ovens and machines). The cost of refractory prisms is 4*s.* per 100.

This is the comparative cost of the new light per hour, based on the previous data:

		d.
25-candle burner will consume oxygen	1,755 cubic inches cost...	0·070
25-candle burner will consume ordin. gas	1 cubic foot..	0 038
	Total....	0·108
The same amount of light obtained with 12½ cubic feet of ordinary gas will cost.....		0·475

By comparing these data, the new light will be cheaper than ordinary gas for the same amount of work.

I conclude my paper by expressing a wish that we may soon have the benefit of this new light in London, as being much superior to gas or to the incandescent electric light, while it is also more simple and cheaper.



THE MAGNESIA LIGHT.

The Effect of Oil upon Waves.

In reply to an objection of Admiral Bourgeois that the actual effect of oil upon waves should be fully tested before it is submitted to theoretical analysis, M. G. Vander Mensbrugghe replies that he has shown from incontestable facts that the wind produces upon the superficial layer of the sea a horizontal motion of translation, which, being sufficiently prolonged, can communicate to the deeper layers, and can propagate to a great distance very decided undulations. He has confined himself to a discussion of two cases: in the first, where the calm sea is covered with a thin layer of oil, and is then submitted to the action of the wind; in the second, where the waves break. In the first case the formation of great waves is rendered impossible by the presence of the layer of oil. In the second, a simple calculation shows that the layer of oil exerts a great resistance at the base of the breaker, and thus compels it to extend itself and to subside very rapidly without producing severe wave shocks.—*Comptes Rendus.*

Successfnl Surgery.

A rather remarkable surgical operation was lately performed in this city at Bellevue Hospital, by Dr. Joseph W. Howe. It consisted in the removal from the bladder of a boy sixteen years old of a stone three inches long and two inches thick, weighing 3,541 grains, being a little over half a pound; owing to its large size, the stone could not be crushed and removed in the ordinary manner; an incision was made above the pubic arch, three inches in length. The patient recovered, and was discharged in about two weeks perfectly cured. Good for the boy, good for the doctor.

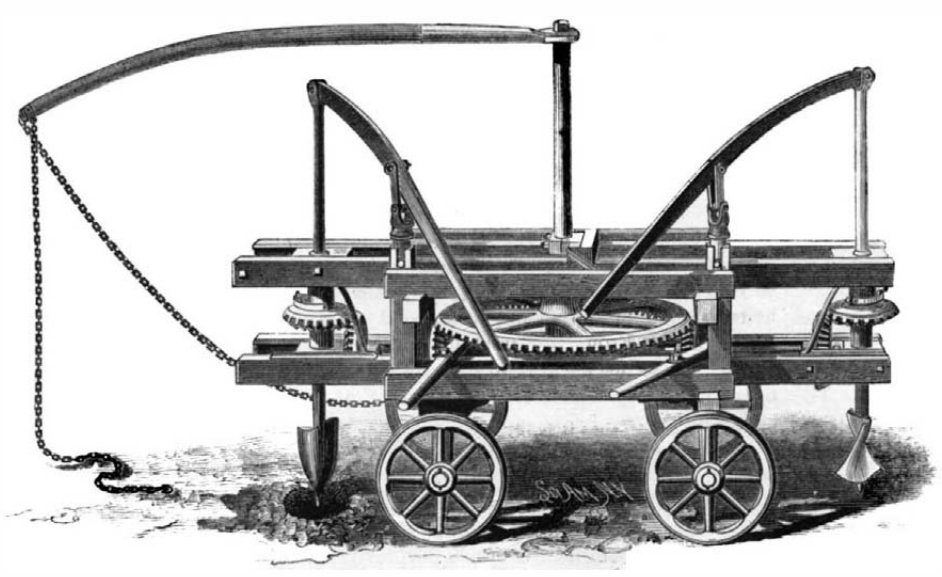
POST HOLE BORING MACHINE.

We give an engraving of a novel machine for boring post holes. It is designed for boring holes six, seven, or eight feet or more apart, according to the length of boards to be used. The machine is operated by one horse, and is capable of boring two holes simultaneously.

A solid frame mounted on truck wheels carries a central vertical shaft having on its upper end a sweep. On this shaft within the frame there is a bevel wheel, which drives two horizontal shafts, each of which communicates motion to a vertical sleeve by means of miter gearing. Each sleeve contains a longitudinally grooved shaft, which is free to slide up and down, but is made to turn with its sleeve by means of a pawl carried by the sleeve and entering into the slot in the shaft. The shafts carry at their lower ends the augers, and are provided at their upper ends with levers, by means of which they are forced down into the earth or withdrawn therefrom. One or both of the augers may be driven by the horse hitched to the end of the sweep.

By means of this simple machine post holes may be bored with great rapidity and uniformity. When a pair of holes have been bored, the machine is drawn along by means of the chains.

This useful invention has been patented by Messrs. William Graham and William H. Staley, P. O. Box 773, London, O.



GRAHAM & STALEY'S MACHINE FOR BORING POST HOLES.

Dyeing and Printing by Electricity.

For some time past Professor Goppelsroeder has been experimenting with electricity as a direct means of fixing dyestuffs upon textile fabrics, and some of the results obtained have been of a certain success, so says the *Textile Manufacturer*. His latest trials have been with the galvanic current: (1) As a means for depositing and fixing dyestuffs upon textile fibers. (2) For the purpose of destroying the dyes fixed on the fibers, and thus producing white designs, or at the same time to produce new coloration on the original colors. (3) To prevent the oxidation of colors, while being deposited, during the process of dyeing and printing. (4) For the production of vat dyes, such as indigo or aniline black, etc.

We quote the following examples of Goppelsroeder's process, as given by him in contributions to our Continental contemporaries:

In order to show the deposit of dyestuffs, aniline black may be taken as an instance. The cloth is saturated with a watery solution of an aniline salt, by preference a chlorine hydrate. It is then deposited upon a metal plate, which is isolated by resting upon a sheet of glass or India-rubber. This metal plate is placed in communication with a galvanic battery or a small dynamo machine. A second metal plate, containing in relief the pattern to be produced, is then placed upon the cloth and brought into communication with the other pole. If now the necessary pressure is applied, and the electric current passed through the damp cloth, the design will be produced in black. The time required for this deposit varies from a few seconds to about a minute, according to the ductility of the solution, the thickening medium, the nature of the acid of the salt, the temperature, and the intensity of the current. Medals and coins can thus be copied accurately, but at the same time with all imperfections. By an imperfect development this black may be changed into the green called emeraldin, or a mixture of black and green. In place of the upper plate a metal pen may be used, and thus drawings or writing be produced.

Professor Goppelsroeder is still occupied with trials as to the best thickening medium, so as to obtain sharp outlines, and so far he has obtained the best results with gum tragacanth, gelatine, or starch, while his experiments also tend in the direction of temperature, the nature of the electrodes, the concentration, and the reaction of the solutions which are subjected to the electrolysis, the necessary pressure, strength of the current, and other concomitant items.

As a practical application of this invention, Professor Goppelsroeder suggests its use in bleach and dye works for the purpose of marking or stamping the ends of the cloth so that these marks are not obliterated by the subsequent dyeing or bleaching. Where it is desired to dye yarn aniline black, it is necessary first to mordant it by a deposit of a metallic composition. It is then dipped as a positive electrode into the solution of aniline black, which also contains the negative platinum electrode, which produces dishydrogenation of the aniline or formation of black on the fiber, and its fixation at the moment of its formation.

The discoloration of certain dyes, as, for instance, turkey red or indigo blue, is produced in a similar way. For this purpose the cloth is saturated with saltpeter, common salt, or chlorine of alumina, the other arrangements being similar to those described above. On the passage of the current nitric acid is produced on the positive pole in the first case, and chlorine in the two latter cases, both of which produce white. If salts are used which, on being decomposed, form bases which are qualified to act as mordants, it is possible thus to produce new colors.

The professor is occupied with trials to deposit in this way not only bases forming mordants, but also the dyes themselves, such as artificial alizarin, purpurin, etc. In like manner aniline black has been deposited upon turkey red goods for the purpose of marking them with figures or writing.

As to the application of the galvanic current, mentioned at 3, it is to be noted that here the negative electrode plays the chief part. Metals are thus deposited, and at the same time fixed upon the fiber, by first saturating the cloth with a thickened solution of the salt of the desired metal and then bringing the negative electrode into action.

To prevent the oxidation during printing the color box is brought into contact with a wire from the negative pole of a battery or a dynamo machine, while a small channel of the color contains the positive electrode. This produces hydrogen at the negative pole and thus intercepts oxidation. This is valuable in printing with many colors, such as solid blue, and especially aniline black.

The galvanic current is useful in the manipulation with indigo by the formation of hydrogen on the negative pole, which produces a reduction of the dye in the same manner as copperas, zinc, glucose, etc.

As an idea suggested by these experiments, we may also mention the possibility of writing at a distance by the direct application of telegraphic or telephonic communication.

* Read before the Photographic Society of Great Britain.

† The ordinary pressure of gas, as supplied by a gas company, can be considerably reduced by opening the taps very slightly.

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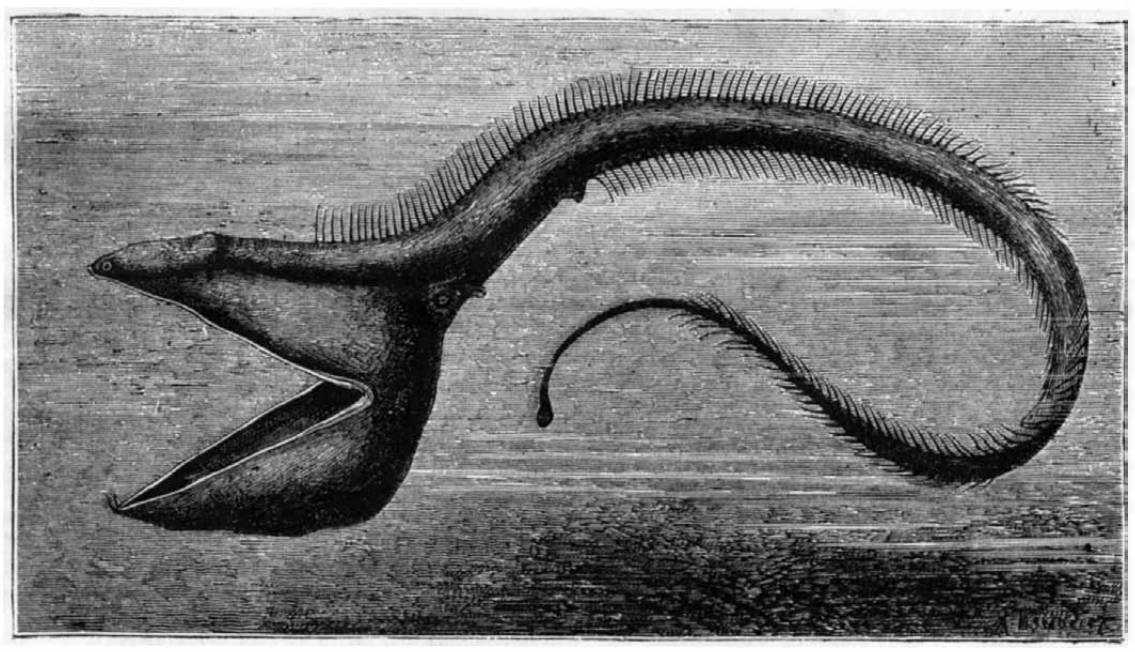
A NEW DEEP SEA FISH.—(*Eurypharynx pelecanoides.*)

During the last cruise of the Travailleur we found off the coast of Morocco, at a depth of 2,300 meters, a fish which may be regarded as one of the most singular beings that deep sea dredgings have ever brought to light. This animal, which is about 0·47 meter in length and 0·02 meter in width at the widest part, is of an intense black color. The body, whose form is hidden in front by the abnormal mouth, recalls that of the *Macrurus*. It tapers off regularly from the anterior quarter, at which point is observed the external branchial orifice, and terminates in a point at the caudal extremity. The anus is located at the junction of the anterior third with the two posterior thirds of the body.

What gives this fish a very peculiar physiognomy is the arrangement of the jaws and the conformation of the mouth, which further exaggerate what Mr. Ayres has described in the *Malacosteus niger*. Although the head is short (scarcely 0·03 meter), the jaws and suspensorium are excessively elongated, the latter measuring no less than 0 095 meter. It results from this that the articular angle is carried very far back, to a distance from the end of the nose equal to about three and a half times the length of the cephalic portion. This suspensorium, as far as can be judged, consists of but two pieces—the one basilar, analogous to the temporal, and the other external, representing without doubt a tympano-jugal. The upper jaw is formed of a long and slender stylet, the situation of which should approximate it to the intermaxillary. The maxillary is wanting, unless we admit that these two bones are confounded.

Upon both jaws small dental granulations may be felt; and at the extremity of the maxillary bone are seen two hooked teeth, 0·002 meter in length. The buccal orifice, as a consequence of such an arrangement, is enormous, and leads to a cavity whose dimensions are still more astonishing. In fact, the upper jaw is united to the sides of the head and of the fore part of the body by an extensible cutaneous fold that permits of considerable stretching; and, between the branches of the maxillary bones, there extends an analogous cutaneous membrane which is much more dilatable, and contains, as shown by a histological examination, a large number of elastic fibers in bundles. It may be well compared with the mouth of the pelican.



THE EURYPHARYNX PELECANOIDES.

As a consequence of the stretching of the jaws and the extensibility of the membranes, the mouth in the living animal forms, along with the pharynx, a vast funnel, of which the fish's body seems to be the tapering continuation. It is presumable that food accumulates in this pouch, and may be partially digested therein, a fact comparable with what has been pointed out in the *Chiasmodus niger*, Johnson.

The locomotive organs are of the most rudimentary nature. The side fins are reduced to two very small appendages whose position near the branchial orifice should make them correspond to the pectorals. The ventrals are wanting. At a distance from the occiput nearly equal to the length of the head begins a dorsal fin which extends nearly the whole length of the back without, however, reaching the end of the tail. The anal fin, which has a similar arrangement, has its origin at a few millimeters behind the anus, and ends at the same point as the dorsal. The extremity of the body is surrounded with a small membranous fold—a sort of rudimentary caudal fin. The delicate and flexible rays of these odd fins are not articulated, or, as far as can be judged from the animal preserved in liquor, united by a membrane.

The respiratory apparatus offers a structure which is as yet unique in bony fishes. We find six pairs of internal branchial clefts, and consequently five branchiæ. These latter are each formed of a double series of free lamellæ. The water makes its exit from each side through a very small orifice that forms a simple rounded cutaneous perforation situated toward the level of the termination of the bucco-pharyngeal infundibulum. Neither a hyoidean apparatus nor opercular pieces are found.

Without entering into a description of the organs contained in the abdominal cavity, it is important to note the complete absence of a swimming bladder.

I propose to designate this fish by the name of *Eurypharynx pelecanoides*.

What place should it occupy in the ichthyologic series? This is a point difficult to judge of in the absence of more complete information as to its anatomy, and particularly as to its skeleton, which it is not possible to examine in all its details in a single specimen.

It may be said that the fish offers affinities with the *Anacanthini*, with certain *Physostomi*, such as the *Scopelidæ*, the *Stomiatidæ*, and with the apodes. Although approaching these latter in the absence of ventral fins and in the imperfect opercular apparatus, it differs too much therefrom in its well-developed and free intermaxillaries to allow it to be placed in that group. As regards the *Scopelidæ* and *Stomiatidæ*, all the known genera of these families have a very widely opened branchial orifice. In the first, the intermaxillary forms alone the free edge of the upper jaw, and in the second the maxillary enters therein for a part. It is to the *Scopelidæ*, then, that the *Eurypharynx* is related, inasmuch as it does not exhibit the hyoidean barbel that has up to the present been indicated as characteristic of the *Stomiatidæ*. And of all fishes placed in the *Scopelidæ* by naturalists, it is with the *Malacosteus niger* that we should be tempted to compare the animal under consideration, inasmuch as that fish alone presents us with the simple arrangement of the suspensorium noted above. But it is perhaps with the *Acanthini* that the affinities appear most real, either as respects the form of the body, which recalls that of the *Macrurus*, or as respects the absence of the ventrals, which is habitual in certain animals of this group. So too several *Ophididæ* and all the *Lycodidæ*—the latter with their branchial orifice reduced, although not to the point that occurs in our animal—furnish still another probability in favor of this view. However, the characters of the *Eurypharynx* are so decided that it must, in any event, be regarded as the type of a new family of which it will be the only representative, if future studies do not show that it must be joined to the genus *Malacosteus*. —*L. Vaillant, in La Nature.*

The Latest Improvements in Dyes.

A. Ehrhardt, of Basel, says the most important discoveries of very recent date in the domain of artificial dyestuffs are those made by Otto Fischer in Munich. The various new methods of preparing rosaniline, the starting point for so many other dyes, may have some importance, as none of the methods hitherto in use can be considered rational, and the yield of fuchsine (hydrochlorate of rosaniline) from either process now in use, either with arsenic acid or with nitrobenzol, never exceeds 33 or 36 per cent of the mass fused, and results in the production of a disproportionately large amount of worthless by-products. Passing over the previous attempts to improve on them, the writer proceeds to describe the new processes of Otter Fischer for making rosaniline.

Triamidotriphenylmethan and its derivatives are first made by uniting the hydrochloric acid salt of paranitrobenzaldehyde with the aromatic amines, in the presence of chloride of zinc to form leuco bases. The process is as follows: 10 parts of the paranitrobenzaldehyde are dissolved in 50 parts of alcohol and 50 parts of hydrochloric acid added. To this solution he adds gradually 12 parts of pulverized zinc and warms gently until it is all dissolved. The alcohol is next distilled off, the mass evaporated on a water bath to dryness, and the whole mass heated with 17 parts of hydrochlorate of aniline and 10 of solid chloride of zinc to 250° or 280°. From this fused mass the paraleucaniline is isolated in the usual way, and then converted into rosaniline by any oxidizing agent, like black oxide of manganese or choranil.

If orthotoluidine, or xylidine, is substituted for the aniline, the result will be a homologue of leucaniline. Instead of aniline the mono or di methylaniline can be used and the leuco base of methyl violet obtained. With benzylmethyl or ethyl-aniline the bluish purple dyes are produced.

Another method of making rosaniline and its salts has been proposed by Fischer, which sets out with the nitro-leuco bases. He heats 15 parts of paranitrobenzaldehyde with 30 parts of sulphate of aniline and 20 or 30 parts of chloride of zinc until the nitro body has nearly disappeared. This gives a nitro-leuco base, which is converted into a dye by suitable oxidizing means like corrosive sublimate.

Dyes of the rosaniline group are made by the action of nitrobenzylchloride upon salts of primary aromatic amines in the presence of oxidizing agents. One equivalent of nitrobenzyl chloride is heated with two of the sulphate of aniline or toluidine, or a mixture of both, with the addition of one equivalent of perchloride of iron, to about 300° or 350° C. The fused mass has a bronze luster, and the dye can be extracted with water. By using the sulpho-acids of aniline, toluidine, etc., aniline dyes can be obtained that contain the sulpho group.

Some new blue and violet dyes have been made by Koechlin and Witt, by two different methods. First, the nitro-derivatives of tertiary aromatic amines or phenols are brought in contact with alkaline or ammoniacal solutions of phenols, and reducing agents like zinc dust, protoxide of tin, or grape sugar. Secondly, slightly alkaline, neutral, or slightly acid mixtures of phenols and amines are treated with oxidizing agents, which may be atmospheric oxygen, chromates, ferricyanides, permanganates, hydrochlorites, and the like.

A blue color is also made from amidodimethylaniline and phenol or alpha-naphthol. This dye can also be produced on the fiber, which is of importance in calico printing. The goods are impregnated with a solution of naphthol soda, and when this is dry it is printed with a thickened solution of hydrochlorate of nitrosodimethylaniline mixed with protoxide of tin or grape sugar. Another method consists in printing with a thickened solution of the aniline and naphthol bodies upon cloth saturated with a solution of grape sugar. Or, these two substances are printed on goods not previously prepared, but which is subsequently run through a solution of bichromate. These blues are said to be very permanent in sunlight, so that they can replace indigo with advantage.

Corn, Beans, and Pumpkins.

Prof. Asa Gray contributes to *Science* an interesting review of De Candolle's new work, "The Origin of Cultivated Plants," and gives the following concerning the history of our well known trio of staples:

Phaseolus vulgaris, our common bean,* ranks in De Candolle's table as one of the three esculent plants, the home of which, even as to continent, is completely unknown. Linné credited it to India, as he did our Lima bean also; but he took no pains to investigate such questions. This has been so generally followed in the books, that even the "Flora of British India," in 1879, admits the species, adding that it is not anywhere clearly known as a wild plant. But Alph. De Candolle, in his former work, had discarded this view, on the ground that it had no Sanskrit name, and that there was no evidence of its early cultivation in India or further East.

Adhering, however, to the idea that our plant was the Dolichos and the Phaseolus or Phaselos of the Greeks, and of the Romans in the time of the Empire, he conjectured that its probable home was in some part of Northwestern Asia. But recently, as "no one would have dreamed of looking for its origin in the New World," he was greatly surprised when its fruits and seeds were found to abound in the tombs of the old Peruvians at Ancon, accompanied by many other grains or vegetable products, every one of them exclusively American. In his present very careful article he admits that we cannot be sure that it was known in Europe before the discovery of America, and that directly afterward many varieties of it appeared all at once in the gardens, and the authors of the time began to speak of them; that most of the related species of the genus belong to South America, where, moreover, many sorts of beans were in cultivation before the coming of the Spaniards; and the idea that it might have been native to both hemispheres is discarded as altogether improbable. Upon this showing, it would appear that the plant should have been set down as of American, rather than of wholly unknown, origin. Indeed, when all the evidence is brought out, the discovery of these beans in the Ancon tombs need excite no more surprise than that of the maize which accompanied them.

For maize, beans, and pumpkins were cultivated together, immemorially, all the way from the Isthmus to Canada. And, although some of the sorts of beans mentioned by Oviedo in 1526, as raised in great abundance in Nicaragua, where they are native, and also of those everywhere met with by De Soto (1539–42) in his march from Tampa Bay in Florida to the Mississippi, doubtless belonged to Phaseolus lunatus, yet most if not all of those which at the same early period Jacques Cartier found cultivated by the Indians of Canada must have belonged to Phaseolus vulgaris, or its dwarf variety, P. nanus; for only these are well adapted to the climate of Canada, especially the low and precocious variety, which alone has time to mature between the spring and the autumn frosts. Indeed those same beans, derived from the Indians along with maize and pumpkins, have doubtless continued here in New England in direct descent, to form that staple diet for which the northern part of the coast of Massachusetts has long been famous; so that when Rufus Choate, defending a ship captain against a charge of

* Bean in Great Britain is Faba (the fève of the French), and the varieties of Phaseolus are called French beans.

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ill treatment in having fed his crew exclusively upon it, rehearsed, in his accustomed affluence of language, the praises of "that excellent esculent and superlatively succulent vegetable, the bean," he was celebrating the good qualities of a distinctively and aboriginally American article of food.

We are not to suppose, however, that this species had its home in North America, at least north of Mexico. The same may be said of our squashes and pumpkin, for which similar reclamation may be attempted upon another occasion.

Patent Law Amendment in England.

The annual discussion of patent law changes and the introduction of a new bill in Parliament is now going on once more in England. For several years past each proposed bill has for some reason or other failed to pass. Every year a new discussion and further study of the subject takes place among those who are interested in the subject; and every discussion seems to tend toward the formation of a public opinion in favor of a new patent law that shall have a practical similarity to that of the United States.

Some very interesting papers on the patent law amendment have been read before the Society of Arts, London, followed by spicy discussions thereof on the part of intelligent members. Sir Frederick Bramwell lately read a fresh paper on the subject before the Society, which is particularly noticeable owing to the fact that last fall he came over to this country for the special purpose of studying the working of our patent law system. His recent paper, from which we will give abstracts, may be regarded as a kind of report of things that came under his notice while in the United States.

He states that he put himself in communication here with many persons competent to advise on patent matters, among whom were patentees, manufacturers, lawyers in practice, and the Commissioner of Patents. Mr. Marble, who gave him various special facilities for information. He says:

"The first thing that strikes an Englishman, accustomed to consider these subjects in his own country, and to hear the views not infrequently expressed there respecting them, is the totally different feeling that prevails among the public generally in the United States, and (no doubt, as a consequence of this different feeling) the difference in the spirit with which patent matters are dealt with by the United States Government.

"This feeling is well shown by the following passage in the report of the United States Patent Commission, issued in 1870, when, the question having been raised as to whether certain reports were worth their cost, the Commissioner expressed his opinion thereon, and on the value of patents generally, in these words:

"'In view of the great benefits which the patent system has already conferred upon the nation, single inventions—like the sewing machine, the harvester, the telegraph, or vulcanized rubber—having more enriched the country than the whole system has cost from its inauguration to the present time, I believe that the expense of retaining the mechanical report, in addition to the new publication, would be fully justified.'"

But in England, he says, "I commonly hear the jeering remarks that are made about most men who exercise themselves in invention, not about all men who do so, for it has been well said 'there is nothing succeeds like success,' and when a man has become known to the public as a successful inventor, he may further invent without reproach, although the very subsequent inventions of such a one would, had they emanated from a beginner, have given rise to the common sneer, 'Oh, so and so has become an inventor;' the fact is, if the man is your friend, and you are advocating, say, his fitness for election into some club or society, you have to confess that he was weak enough to invent, but that it was done in a thoughtless moment, and to express your belief that hereafter he will refrain from any such reprehensible conduct, and, if admitted into the club or society, will henceforth behave himself with the utmost decorum.

"This grudging acknowledgment of patents and patentees is shared in by the government. I don't mean the government of the present day, or that of any other political party, but I mean those in power for the time being. Instead of looking upon inventors and inventions as being the source from which improvement, and thereupon, prosperity, comfort, health, and the maintenance of the revenue of the country, depend, they regard them with jealousy, and doubt whether the patent laws, that give property in invention, ought not to be abolished; but feel sure that while they are continued, their only, or at all events, their greatest utility is that of adding by a voluntary taxation to the income of the country. Thus it is that the government, while taking over £200,000 a year from patentees, grudge the expenditure necessary for proper buildings, efficient staff, efficient control, creditable publications of the patents and their drawings, and room to store them.

"How different from all this is the state of things in America, and is so whether one looks at public opinion and feeling or at the conduct of the government, the reflex of that opinion and feeling. If you talk with men of position and influence in America, you find they speak with pride of the inventive fecundity of their countrymen; if they wish to interest you in a man whom you are about to meet, they will commonly do so by relating his inventions. In America, it is well understood that to their inventors they owe their success in manufacture, and the inventor is, therefore, with them looked upon as a benefactor, and as one to be encouraged and not to be sneered at as he too often is here. All unconsciously many an Englishman recognizes the development of American industries due to inventions, for it is a common thing to hear said, when something peculiarly novel and ingenious is being discussed, 'I suppose this comes from America.'

"Next, as regards the action of the government. How do they treat inventors? And, first, what accommodation do they afford for the patent business? Upon this point, although it is a thrice told tale in these rooms, I must refer to that which strikes the eye of any one visiting Washington. Among the many fine buildings of that city, the one that takes the second, or the third place, is the patent office. The Capitol comes undoubtedly first; whether the treasury or the patent office comes next, I am not quite clear, but I am clear that the patent office is a building measuring about 450 feet by 300 feet, of handsome elevation, and of excellent material (white marble), and surrounded by fine streets on all four sides. In this building, there are a staff of 491 persons engaged on the patent business, which staff is about to be increased, the whole superintended by a Commissioner of Patents. Notwithstanding the small fees paid by patentees, the receipts, in 1881, were $853,000, or £170,600; and I was told that the receipts for the current year would be $1,000,000, or £200,000, while the expenses of 1881 were £116,000. With the object of diffusing information regarding patents throughout the vast territory of the United States, as many as 20,000 copies of the patent law, and of the rules, are sent, per annum, gratuitously to different parts, while, as a proof of the interest taken by the public in the subject, I was informed that the average daily sale of specifications has amounted to 2,000 copies."

In the discussion, Captain Galton, the chairman, said: Among the most important of the questions which it raised, was whether we should in England follow the old practice of regarding the inventor as the enemy of the public, or adopt the American view, that he was a benefactor to the community. The Society of Arts Bill had been drawn on the latter view, and he was very glad to find that it was to be again introduced in the ensuing session of Parliament.

Mr. W. E. Newton said he expected to have heard more about the practice in the American patent office, especially with regard to examinations for novelty; and should be quite willing to have all applications examined as to novelty, in order that the supposed inventor might be informed if he were not really the true and first inventor; but the new bill did not touch that subject.

Mr. Imray said: If it were possible, by any system of examination, either as to subject matter, novelty, or utility, to give a patentee an indefeasible right, examine by all means, but so long as the right remained just as questionable after, as it was before, what was the good of examination? The patentee got no benefit, nor the public either. Patent agents who had to take out patents in America knew what difficulties they had to contend with there, the most frivolous objections being sometimes raised by the examiners. To give an example: a client of his invented a method of turning the slag for blast furnaces, by the addition of certain chemicals, into very excellent glass for bottles; he applied for a patent in America, and the objection raised was that in some book, thirty years old, there was this sentence: "The slag of blast furnaces is of a vitreous nature."

Mr. Tweddell said he had had a good deal to do with patents, and might say a few words from the patentees' and users' point of view. He was glad to find that Sir Frederick Bramwell had found so little to say in favor of the American system as being superior to our own. On the whole, he thought Sir Frederick's bill stood out much better after Sir Frederick's visit to America than it did before. No less than 13 per cent of the patents taken out in England in 1882 were by the Americans, 9 per cent by Frenchmen, and 8 per cent by Germans, which showed that even the law of 1852 was not unfavorable to inventors. With regard to the improvement in the national resources by lowering the scale of fees, they had heard that if a few dollars had to be paid at the end of six years, 25 per cent of the American patents would be swept away, which did not say much for the value of American patents as a whole; perhaps the same would apply to this country.

Mr. James Wilson, like the previous speakers, had expected that the American system would have given more information how to reform our patent laws than appeared to be the case. The main points seemed to be that the American system was so much cheaper, that the patent lasted three years longer, and that there were examiners. The history of patents disclosed several facts unfavorable to the system of examinations. He believed that in Germany both Bessemer's and Siemens' processes were refused a patent, and if this was done under an enlightened government like the Prussian, he did not see how examination would prevent wrong being done. If examiners were appointed at all, he thought it would be necessary to have a large number, representing every branch of science, for it often happened that specialists were wonderfully ignorant of matters only just outside their own immediate subject.

Mr. Alfred Carpmael said Sir Frederick Bramwell had referred to several reports of the American Patent Office, but he might be pardoned for reading a few lines from one he had not mentioned, bearing on the position of inventors: "No right can be more unquestionable than that resulting from discovery, unless it be that which is derived from actual creation. The recognition of either, if not instinctive in the brute, is certainly found in the lowest and most uncultivated orders of human intelligence. The bird seems to have a sense of the property in its nest; the beast in its lair; the savage certainly in the cave he has discovered, or the weapon he has made. Even the first occupant of a tract of land, which he has neither discovered nor created, has a title which, in the absence of a better, is protected by the governments of all civilized countries. To none of these is the title of the inventor at all inferior. He has created or discovered all that he claims the right to possess. The property for which he asks protection might never have existed but for him who has created it out of nothing. At least, he has called it into active being, and made it the servant of mankind, subject to the limited right of ownership which he claims for himself. And when it is remembered that it is chiefly through the exercise of the inventive faculty that civilized man has risen above the savage, or that even the savage is to be distinguished from the brute, that it is the inventor who has either directly or indirectly been, and still is, the great instrument of human progress, that his has been the wizard wand which has called forth from the latent powers of nature messengers and servants, surpassing in fleetness, power, and mute obedience, the fabulous genii of Eastern tale, which has seized and freed as by enchantment the transient and varying lineament, or the flying sound, and transmitted them unchanged to posterity; or that in humbler but perhaps equally useful endeavor, he wears out his life in often unrequited efforts to benefit mankind, it must be a mistaken or perverted impulse which would grudge him that protection which is accorded to all others, or that would fail to encourage in all suitable ways, efforts from which the world is now reaping such incalculable benefits. . . . The reason why hundreds of intellects in all parts of our country are strained to their utmost tension in the attempt to discover something that shall prove useful to mankind, is attributable to the fact that individual profit is incomparably blended with the general welfare. But who would cultivate a field if others were to have an equal right to reap the harvest? The acknowledgment and protection of private property are the parents of industry, and effect as much in relation to inventions as to any other species of possession or estate.

The last speaker said that political economists opposed patents, but he had found that one of the greatest of them, Mr. J. S. Mill, had recorded his opinion that the proper way to reward inventors was by granting patents, not to give them a public grant, because then those who used the invention would pay for it, and he further considered that an invention ought to be protected, and the inventor rewarded. He wished to point out the especial hardship of the present law with regard to foreigners, of which there had recently been an important exemplification. Nobody doubted who was the inventor of the phonograph, and under any proper law Mr. Edison would not have had to abandon that child of his; but because it had been held that he did not sufficiently indicate the nature of his invention in his provisional specification, he had had to disown that latest child of his genius. Sir Frederick Bramwell had expatiated on the position of an orphan invention found in the gutter; but what was the position of the phonograph? Discarded by its inventive father, declared illegitimate by the laws of the country, incapable by law of having any relations of any sort or kind, how long that poor invention would live but for the fact that its twin brother in America was still protected, he did not know; but he feared that if it were not that Mr. Edison was still left to protect it in America, we should have heard no more of it. Yet he saw no reason to doubt that, in the immediate future, that which was now a mere toy would prove as useful to the community as its cousin, the telephone. To give another instance:

A gentleman named Wegmann made an invention, which had revolutionized the whole milling system of the civilized world. After many years' experiments he devised a system whereby he mounted cylinders of porcelain on rollers, and turned them up true; and by their means he produced the results of milling on semolina, middlings, and other products of grain, without any of the mischief which arose from the grinding operation of the millstones. The value of the invention was admitted, in a recent trial, to be upwards of £400,000 a year to this country, a large proportion of which was derived from what was previously a waste product, going away with the bran into the washtub. But because this gentleman was a foreigner, and there was no one to tell him, in the first instance, that he was not sufficiently clear, and no means of amending afterward, the patent was lost to him in this country. The translation made was, "I coat rollers with china;" and the court held that coating meant something in the nature of painting or enameling, and as there was not sufficient information in his original patent, no amount of disclaimer could put any more in. He never thought of this case without a feeling of shame that our law was in that condition. He thought, therefore, they would all agree with the concluding part of an article in the leading journal of the previous Wednesday, that "it would be expedient in the new law that more tenderness should be shown toward the rights of inventors in the experimental stages of their labors."

A CORRESPONDENT of the *British Medical Journal* (Jan. 13, p. 90) states that he has found the application of a strong solution of chromic acid, three or four times, by means of a camel's hair pencil, to be the most efficient and easy method of removing warts. They become black and soon fall off.

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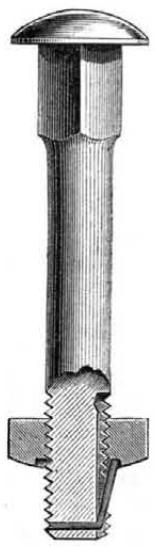
RECENT INVENTIONS.

Novel Transplanter.

This invention consists of a pair of concavo-convex plates of nearly semi-cylindrical form at one end, but narrower at the other, pivoted together by strap ears near about the middle of the edges of said plates to enable them to be extended and contracted at the respective ends, said plates being provided with a latch device, to secure the ends which enter the ground in the contracted position for raising the plants together with the necessary surrounding earth, the parts being detachable and adjustable at the pivot joints to adapt the device to the size of the plant, and to enable the parts to be applied separately to the plants when necessary for the protection of the branches, and afterward connected to raise the plant together with the earth surrounding its roots. This invention has been patented by Mr. William Spitznass, of New Athens, Ill.

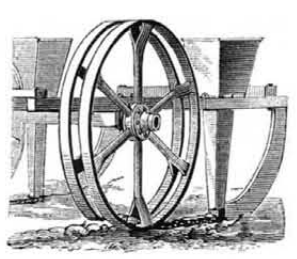
New Nut Lock.

This nut lock consists in a straight metal spring arranged within a longitudinal groove in the bolt, and engaging at its free end with a recess in the outer face or back of the nut to hold the spring from flying too far outward, and to act as a catch or stop to the nut to arrest it from being worked off the bolt. The spring is secured to the screw-threaded end of the bolt by bending it at its outer end to lie within a cross groove in the end of the bolt, and riveting the grooved end of the bolt over the bent end of the spring. The nut may be removed after depressing the spring, but it cannot be loosened accidentally. The spring offers no appreciable resistance to the movement of the nut. The nut lock is particularly adapted to fastening carriage tongues and shafts, and it may be used in other places where an ordinary bolt would jar out. The invention has been patented by Mr. John J. Waddill, of Montgomery, Ala.



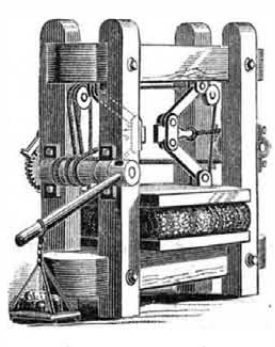
New Corn Planter.

This invention consists of a wheel for corn planters, having a groove or space in the center of the tire to aid in covering the grain and leave along the line in which the corn is dropped a ridge of earth unpacked by the wheel, to avoid the hard crust of earth which is formed over the seed by the rain and sun, when the wheel treads and presses down the earth the whole breadth of its tread along the line in which the corn is planted. Such a crust is very injurious to the young plants, offering a resistance to the growth, sometimes making it necessary to go over the field and break up the crusts with hoes to enable the corn sprouts to come up. The wheel has two narrow tires of iron mounted on branch spokes, the tires being placed a little distance apart, and having the inner edges turned inward or toward the hub to leave a narrow ridge of soft earth with sloping sides that will shed the rain well This invention has been patented by Mr. J. McDaniel, of New Hampshire, O.



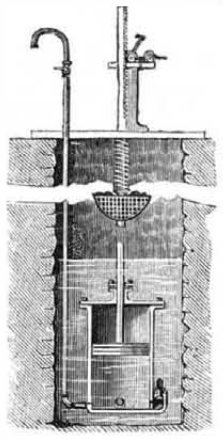
Power Press.

The engraving shows an improved power press recently patented by Mr. O P. Morgan, of Hazelton, Mich. The frame of the press is composed of the upper beam, and the lower beam or platen, and two pairs of bars, which tie the beams together. The follower of the press is placed between the vertical bars, and may be moved downward with great power, straightening out the toggle levers that are pivoted to it and to the beam above. The toggle levers are operated by means of the winding shaft journaled at the outside of the vertical bars, and the ropes that are attached to the shaft and to the blocks secured between the plates (four in number), that join together the adjacent ends of the parts of the toggle levers. The rope before reaching the shaft is passed over a pulley journaled in suitable blocks attached to the outside of the frame, so that it will give the proper outward movement to the toggle lever farthest from the windlass. The shaft of the windlass is provided with a ratchet and pawl to prevent retrograde movement. This press is adapted to a large variety of uses, is very simple and powerful, and is quickly and easily operated, and by attaching a weight to the lever, as shown in the engraving, the press is adapted to exert a continual pressure, thus making the press particularly adapted for pressing cheese.



Improved Pump.

Messrs. William R. Smith and Neil H. Bigger, of Bentonville, Ark., have recently patented an improved pump, which is shown in our engraving. The cylinder is made large to contain a sufficient supply of water in a charge for the supply of the user for a time, and is placed upright in the cistern or well, or sufficiently near the water for suction, and is provided with suction valves, and a delivery pipe at the bottom. The piston has a rod extending up through the top of the well, and has a toothed rack on the upper part, moved by a pinion operated by a crank. By this means the piston, with the weights placed in the basket on the piston rod, is raised and the spring on the rod is compressed, so that when the pinion is disengaged from the rack on the piston rod, the piston will be forced down by the combined action of the weights and spring, and cause the discharge of the water out of the vertical pipe, the weights and spring (one or both) being employed to expel the water as it is wanted out of the pipe, the amount allowed to escape being controlled by a cock. With a pumping device of this kind water may be supplied to circulating pipes, basins, and tubs throughout a house, thus saving the expensive construction of an overhead cistern.



AMONG the numerous fire escape inventions, one recently patented is being exhibited in Brooklyn in a practical manner. The invention consists of a cast iron box placed beneath the window in the recess, or on the roof, and when in place is secured by two iron bars passing across the width of the box near the top and bottom, firmly embedded in the front walls of the building within the recess. When placed on the roof a brick foundation is carried up from the top of the front wall, and on the top the box is set and held in place by anchor chains and bars attached to the two cross bars and are anchored in the copings on either side. To this upper iron bar is attached a flexible iron ladder of sufficient length when suspended to reach the sidewalk, and when not in use is snugly laid link over link in the box, wholly out of sight. Messrs. Thos. D. Mosscrop and W. H. Barker have an operative model of large proportions on exhibition at their office, No. 9 Willoughby Street. The Building Commissioners, Fire Department, and a number of insurance officials have examined the working of the apparatus, and approve of it. The apparatus not only affords a means of escape for the inmates of a burning building, but is an auxiliary aid to the firemen in extinguishing a fire.

Electricity in Mills.

The Boston *Advertiser* describes a very simple means for obviating the trouble and danger caused by the friction of machinery belts. Under the direction of Mr. Edward Atkinson, President of the Boston Manufacturers' Insurance Company, Mr. F. W. Whiting, a clerk in the latter company, has conducted a number of experiments, and has finally, according to the *Advertiser*, hit upon a simple plan for escaping the difficulty mentioned by the generating of electricity in cotton and woolen mills by the friction of the belts on the pulleys.

This electricity, being carried into the spinning machines, affects the cotton, especially if it is in a loose condition, before it is warped, and causes it to fly apart and stick to all portions of the machinery, thus causing an immense amount of trouble. In printing presses, also, where the roll paper is used, passing rapidly over the rollers in a semi-dry condition, unless the press is on a foundation in direct communication with the earth, so that the electricity can escape, there is so much electricity collected in the paper in a short time that it flies off the rollers and becomes entangled in the press; and in the case of flour mills, in addition to many other troubles, there is the danger of setting fire to the floating mass of finely powdered flour, which, acting as a kind of conductor, draws the electricity from the belting and causes an explosion. The electricity, being generated by friction, is static electricity, which is of great potentiality, and, therefore, dangerous to the life of an employe if the machinery is accidentally touched when highly charged. When Mr. Whiting first began his experiments at the Armory Mill, at Manchester, N. H., he found that the principal belt, which made 400 revolutions per minute, generated so much electricity that when the oiler attempted to oil the machinery he was almost paralyzed. Strange as it may appear, it only required the application of a very simple principle of electricity to remedy the entire evil. The earth is the great reservoir of electricity, and whenever there are proper conductors the current finds its way by the shortest path to the ground. Going into the carding room, Mr. Whiting attached a wire to one of the carding machines and carried the other end to the gas pipe, to which it was fastened. Instantly all the trouble ceased, much to the delight of that gentleman. While this probably would have been sufficient, he thought it best to draw off the electricity as rapidly as it was generated, without its passing through the carding machine; therefore he brought a rod of iron down from the ceiling to within a few inches of the belting, the upper part of the iron rod being connected with the gas or water pipes by a wire. At the lower end of his rod he fastened a brass bar, to which were attached a number of brass knobs, each an inch apart, they being brought up almost in contact with the belting. As fast as the electricity was formed most of it passed through these knobs, and thus through the iron rod, wire, and water pipes harmlessly to the ground; and what little did not do so, after being transmitted through the machinery, passed through the first mentioned wire. Thus, with two ground wires, all the electricity was got rid of, and the serious difficulties it occasioned were obviated. No patents will be asked for on the discovery, and it is expected all cotton and other mills will soon take advantage of it.

The French Cocoon Crop.

It is very satisfactory to find that sericulture in France has very much revived within the last year or two, and bids fair to again become a great French industry, which many circumstances, both primary and secondary, had most unfavorably affected. The principal of these was the competition entered into by Japan, as a seller and reeler of raw silk, in which great progress was made by the introduction of European systems and apparatus. Italy also entered largely into the field, the Italian reelers having built *filatures* which were better and more economically worked than those possessed by the French. The Lyons manufacturers helped the downward movement by selling goods made from Eastern silks in figured patterns instead of the plainer but more solid fabrics which had hitherto been in fashion; but the *coup de grâce* was give to sericulture by the breaking out of the silkworm disease, due in all probability to lack of care and the endeavor of the growers to produce too much. Overcrowding and want of ventilation had been rife for a long time, so that when the disease commenced the worms were swept away by millions, and the trade was nearly exterminated.

Fortunately for France and her silk producers, M. Pasteur's researches into the causes and remedies of the disease have borne good fruit, he having invented a method for the examination of the moths, by which it is possible to preserve the sound eggs and to detect and destroy all those which are infected. During 1880–81 there was a marked improvement in the strength and character of the worms, the chief difficulty then being to get sufficient food for them, as the great majority of the mulberry trees had been neglected, and in many cases pulled up for firewood. During the year which has just passed the difficulties appear to have been surmounted, the "pebrine" and "flachrie," the technical names for the diseases, have very greatly diminished, and France has again become an exporter of cocoons. The *filatures*, which have been professedly unequal to their work, are now being renewed and enlarged, though it is not so easy to obtain the services of the trained *fileuses*, who, in consequence of the failure of the industry, had betaken themselves to other occupations.

New Fining Agents.

Isinglass and the gelatine derived from the skins of fish are the materials usually used in the clarification of beer and wine, and it would be difficult to find better fining agents, but the best qualities of isinglass are very expensive. From time to time vegetable products have been recommended as substitutes for isinglass, and of these several species of algæ, such as carrageen, or Irish moss, are best known. Many nuts and seeds are known to possess great clarifying properties. The clearing nut used by the Hindoos to clarify muddy water is the dried ripe seed of the shrub *Strychnos potatorum*, and possesses wonderful fining properties; it is said that if an earthen vessel be simply rubbed on the inside with one of these nuts, the muddiest water is almost immediately clarified. A fatal objection to the use of these nuts for clarifying a beverage like beer is that they are derived from a plant belonging to a natural order including some of the most virulent poisons known, and, therefore, if not actually poisonous themselves, their use would be attended with considerable prejudice Lately, the kola nut has been suggested as a new clarifying agent; this nut is the seed of the *Sterculia acuminata*, and was introduced into this country a few years ago by Mr. Thomas Christy, F.L.S., who claims for it properties equal to either coffee or cocoa. These nuts contain a considerable quantity of mucilage, which is said to have a very remarkable power of quickly and completely clarifying fermented liquors. The kola nut is not poisonous, but is said to be an infallible remedy for intoxication; so that even teetotalers cannot raise any objection to its being used in the clarification of beer.—*Brewers' Guardian.*

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ENGINEERING INVENTIONS.

An improved car starter, the object of which is to afford increased facilities for starting a street car or other draught vehicle, and of preventing a retrograde movement of the car when stopped on an upgrade, has been patented by Mr. William H. Harrison, of Louisville, Ky. The invention consists in a novel construction and combination of devices for these purposes, and in a special construction of parts whereby the starter may be readily applied to the axle of a car or be detached therefrom, without removing the axle or wheels of the car or otherwise disturbing the connection of the running gear with the body of the car.

Messrs. John J. O'Connor and Ralph M. White, of Wellsville, N. Y., have patented an improved car coupling. The invention consists in drawbars formed with double hooks of spear head form, the taper or bevel of the heads being upon the upper and under side, so that when two cars are brought together the hooks shall pass one above the other and engage by their shoulders. Springs are attached to the sides of the drawbar to retain it in a central position horizontally, and a spring is likewise attached to the upper side of the drawbar to press the bars downward and retain the hooks in engagement. The rods which operate the mechanism pass to the top of the car as well as to the side. The inventor claims for his coupling its special advantage for freight cars.

An improved car coupling has been patented by Messrs. James M. Dulaney and Thomas Owens, of Topeka, Kan. The invention consists of a drawhead containing a movable buffer block, which is projected and held in position to receive the shock by a spring located at its rear. A tube projecting downward is located at the opening of the drawhead and carries a coupling pin which rests on a spiral spring within the tube. When the coupling is to be effected, the coupling pin is held down in the receiving tube by a lip which passes over the top of the tube, and which is attached to the under side of the buffer block. When the coupling link enters the drawhead, the buffer block is driven home and the coupling pin being no longer held by the lip attached to the buffer is liberated and enters the link. A lever is arranged for holding the link in position when the coupling takes place, and another lever is likewise connected with the lower end of the coupling pin, by which the pin may be withdrawn in uncoupling and to which also weights may be applied at its extremities to take the place of the spring in the tube should this be necessary. There is an ingenious device for elevating or lowering the drawhead for cars of unequal height.

MECHANICAL INVENTIONS.

A spout for oil cans, which is of strong and durable make, has been patented by Mr. John Kaye, of Cardington, Pa. The invention consists in winding wire closely around the spout of oil cans and soldering the upper end of the wire to the body of the spout.

A very simple and effective brake for vehicles has been patented by Mr. Ephraim R. Kugler, of Kingwood, N. J., which consists of a spiral wheel to which is connected the brake shaft and connecting rod. The special object of this invention is to avoid the necessity of a spring to detach the brakes, as is required in the usual kind.

Mr. Friederich Cajar, of New York city, is the inventor and patentee of an improvement in pipe wrenches. The invention consists in an additional jaw, which is held in place and operated by a toothed disk. The two jaws are brought together with such force, by means of the mechanism employed, that the pipe is grasped with unusual firmness.

An improved motor for working pumps and driving other light machinery has been patented by Mr. John Harris, of Columbus, Neb. The invention consists in a water wheel connected by a driving shaft with a drum and weight box. With the driving shaft is connected, by gearing, a crank shaft, pitman, and weighted vibrating levers, to assist in driving the machinery and to regulate its motion.

Mr. John Albey, of Montclair, N. J., has patented an improved automatic guide for paper machines. The object of this invention is to provide a guide for the webs of paper machines, which will automatically keep the webs in the center of the rollers over which they pass, and thus prevent the edges of the webs from running in contact with the frame of the machine and becoming worn, folded, and cut by such contact.

An improved cavity plane has been patented by Mr. James England, of New York city. The object of this tool is to provide a frame which may answer for holding tools of various kinds used by carpenters, coopers, and like wood workers. A provision is made for adjusting the face plate of the tool to different distances, so that a deeper or more shallow groove may be cut at the will of the operator. The same implement comprises a shave as well as grooving tool.

An improved ore sizing apparatus has been patented by Mr. Ira F. Monell, of Crisman, Col. The apparatus consists of a series of successively lower and finer sieves and of a series of successively lower aprons, each carrying the finer ore to the next lower sieve in the series until the last apron is reached, and also of cross troughs with water supply pipes at the ends of the sieves to carry off one grade of coarse ore after each sifting, whereby the ore will be separated into as many grades as there are sieves, all being ready for the process of concentration or amalgamation.

Mr. John G. Bronson, of Chicago, Ill., has patented a window ventilator. A sash or deflector plate about one-third of the height of an ordinary sash is located on the sill from one to six inches inside of the lower sash, and is arranged to slide up or down into a recess in the sill in the same manner as the car windows slide into the wall of the car. If fresh air is to be admitted into the apartment, the lower sash is raised more or less, and the current of air entering through the space between the bottom of the sash and the sill will strike against the deflector plate, and will be guided or deflected upward without creating any direct draught in the apartment.

An improved land marker has been patented by Mr. James J. Melville, of New York city. A cord is stretched across the field and kept in place by staples forced into the ground, to serve as a guide for the grooved carrying wheels of the machine. To the under side of the frame is attached a bar, the angular ends of which fit into the grooves of the guide wheels, to keep the said grooves clear of soil, so that they will receive and travel upon the guide cord. The guide cord is laid at a uniform distance from its previous position by means of a spacing bar. To the faces of the wheels are fastened lance-shaped blades or points to form holes in the soil to receive the seeds or plants.

An invention pertaining to the manufacture of sulphuric acid has been patented by Mr. Thomas D. Dotterer, of Charleston, S. C. In the manufacture of sulphuric acid the gas which is blown off by the wind often has a very injurious effect upon crops and vegetation in the vicinity. Under such provision, too, for the escape of the gas it has been very difficult to regulate the draught of the sulphur burning furnaces. These objections are overcome by stopping off the gases on top of the chamber or tower into which they escape from the acid chambers, and drawing or forcing them down into a condenser or receiver, into which water is admitted, and from thence through a vapor bath supplied by steam and water jets. The office of the condenser is to regulate the draught of the acid chamber, and to condense the fumes at or near the surface of the ground under the control of the party having charge of the acid chambers.

An improved railroad signal lantern has been patented by Mr. James H. Berry, of Greenville, S. C. This signal lantern is composed of two cylindrical cases, the outer one being stationary and the inner one made to revolve inside the outer case. The stationary case is provided with two lens tubes situated opposite each other and mounted with plain glass. The inner case is provided with similar tubes, but instead of plain glass they have colored lenses. Within the inside case the lantern is placed, and at the will of the attendant the inner case is turned until the color of lens desired to convey the signal comes in line with the lens tube in the outer cylinder where it is held and locked. The signal may be operated by a cord at some distance away, or held in the hand of the switch tender. By an ingenious arrangement provision is also made for exposing a flag and light of the same color at the same time.

AGRICULTURAL INVENTIONS.

Mr. George W. Carr, of New York city, has patented an improved guide wheel for plows. The invention consists in a metal guide wheel for a plow, made in sections transversely of the axis of the wheel. The wheel is of a close box form, with plain surfaces on its sides, thereby preventing clogging.

Mr. George Lettenmyer, of Little Georgetown, W. Va., has patented some improvements upon the harrow for which he received letters patent 214,671 on April 22, 1879. Two pivoted lever bars are furnished, one of which is so mounted and constructed as to reverse the harrow teeth for the purpose of avoiding any obstruction that may be in the way, and the other is designed to bring the harrow teeth back to the vertical when the opposing object has been passed. The special improvements claimed for this invention consist in the reversing arrangement, which is readily operated by the attendant.

An improved cotton buncher has been patented by Mr. James L. Goodin, of Montgomery, Texas. The invention consists of a wheel to roll along the rows of cotton and crush down the plants, except in certain places, where cavities in the wheel leave the bunches of plants that are to be preserved and cultivated. The wheel is also provided with knives or cutters at intervals along its face, between the cavities, for cutting and otherwise destroying the plants and weeds between the bunches to be retained, and to pulverize the soil. The wheel may be used alone or in combination with cultivators or plows at its sides.

An improved gang plow to be used in the cultivation of corn and other serials has been patented by Mr. Milton McKee Ritch, of Laurinburg, N. C. The invention consists in placing three beams parallel with one another, to which the cultivator teeth are attached, and connecting them by two screw threaded horizontal rods. By means of nuts and washers on these rods the relative distance between the plow carrying beams may be increased or diminished as the case requires, and thus the furrows brought nearer together or further apart. Devices are also supplied by which the guide handles of the plow may be separated from one another, or may be elevated to any desired position.

Mr. William F. Austin, of Greenbush, N. Y., has patented an improved potato digger. The invention consists of apparatus mounted on and geared with the wheels of a truck, by which a set of digging forks are made to revolve upon the axle and thrust into the ground in advance of the hill of potatoes. This digs them out of the ground in front of a rake which separates them from the earth and discharges them on the ground. A gang of discharging teeth suspended above the axle is made to swing backward along the forks as they pass above the rake to brush off any potatoes that may fail of discharging by the motion of the forks.

A truck for portable tracks to be used on sugar plantations has been patented by Mr. Rudolph Baumgartner, of New Orleans, La. The truck is mounted upon a pair of central wheels, and the coupling is accomplished by means of a flat bar of iron arranged lengthwise under the center of the frame of each truck, which bar is provided with openings at the ends to receive connecting links, into which are inserted the locking pins. The truck may be moved by hand or by horse or mule power. The track is made exceedingly light, so that it may be removed easily from place to place, and is of simple construction, requiring little more than a few boards and nails.

An improved cotton planter and cultivator has been patented by Mr. Burrel Morris, of Newton Factory, Ga. The invention consists of a rectangular frame carrying plows suitably arranged for cultivating, which plows may be detached when desired. Within the side bars of the frame is hung on an axle a revolving cylinder which is perforated at regular intervals to permit the reel to pass through. When the machine is to be used for planting, one plow is arranged in front for opening the furrow and two plows are arranged behind the cylinder for closing the furrow after the seed is planted; but if the machine is to be used simply as a cultivator, the cylinder is removed altogether and more plows are attached.

A potato digger of novel device has been patented by Mr. Samuel P. Hedges, of Greenport, N. Y. The invention consists in a potato digger constructed with a carriage, having suspended therefrom a fork plow, adjusted by a lever, a crank shaft, and connecting rods. From the frame of the carriage, in the rear of the fork plow, is suspended by hinged bars a shaft provided with curved fingers, arranged to pass up between the plow prongs, and with stops to cause and limit its movements, whereby the potatoes are raised from the plow and separated from the soil. To arms formed upon the hinged bars of the separator is attached a cross-bar provided with fingers to receive the potatoes from the plow and separator, to sift out the adhering soil, and deposit the potatoes in a row upon the ground.

A cotton picker of simple and inexpensive construction, and designed to be operated by hand, has been patented by Mr. George N. Todd, of Little Rock, Ark. The invention consists of a light frame with sides converging at the front end and provided on the outside with canvas to prevent the cotton boll from being thrown off and falling to the ground. The machine is mounted on wheels, and is propelled by hand directly over the cotton row, so that each plant is brought successively between the inner sides of the machine and in contact with the cylinder rollers, which are rotated by the revolution of the wheels of the machine. The pickers are arranged horizontally one above the other in two series on each side of the passage way, and being geared together by a continuous train of wheels are made to rotate toward one another in pairs, so that the cotton will be effectually stripped from the bush and lodged in spaces on each side of the case, whence it may be removed and placed in baskets at the end of each row.

MISCELLANEOUS INVENTIONS.

A hydraulic cement composed of iron slag, soapstone, clay, and burnt lime of about two parts of the slag to one of each of the other ingredients is the subject of a patent by Mr. John Murphy, of Columbus, O.

An improved bed spring has been patented by Mr. Philander R. Philles, of Carmi, Ill. The invention consists of spiral springs having loops formed at the ends of the uppermost coils, forming a series of semicircles, all made in one continuous piece of wire.

A device for attaching fans to rocking chairs and cradles has been patented by Mr. Moses Cohen, of Hallettsville, Tex. The invention consists of a fan secured to the back of a rocking chair or cradle, and so contrived as to be oscillated by the rocking motion of the object to which it is attached.

An improved last block fastener has been patented by Mr. Rodney Butterfield, of Chicago, Ill. This invention consists of a rod with a T-head, located in the last block, so as to enter a slotted locking plate on the shoulder of the ledge of the last against which the block bears.

An improved oil stone holder, constructed in such a manner that it can be adjusted so that either of its four longitudinal surfaces will be on top, has been patented by Mr. Frank H. Gowell, of Boston, Mass. The stone is suspended in its form by two pivots and held in position for use by means of a set screw to prevent the stone turning when being used.

A novel cigar holder has been patented by Mr. Horace E. Darling, of Brainerd, Minn. The invention consists in a plate having its lower end bent hook-shaped to form a receptacle for a lighted cigar. The holder is attached to the under side of a table or desk top, or to a billiard table, the lower part extending beyond the edge of the table for the convenience of the smoker.

An improved wagon seat top, constructed so that it may be swung forward or rearward to protect the occupants of the seat from wind and rain, and held firmly in any desired position, has been patented by Mr. William Hawkins, of Oregon, Mo. This is accomplished principally by a notched catch plate which is located near the pivot bolt of the top or hood of the wagon, and into which falls a spring latch which holds the top in any position desired

A new combination implement for sealing packages and railroad cars has been patented by Mr. Theodore E. Miller, of Houston, Tex. The invention consists of an implement combining all the tools necessary for rapidly and easily sealing railroad cars and packages with the ordinary wire or tin seals, and comprises seals of different forms for the different material to be stamped, whether it be tin, lead, etc. The implement is also provided with shears for cutting the wire or tin employed in sealing the car.

An anchor of new and ingenious device has been patented by Mr. Charles E. Willis, of Oyster Bay, N.Y., having a grapnel provided with a pair of stationary flukes and a pair of adjustable flukes which are arranged at right angles with the stationary flukes when in use, and may be turned parallel with the stationary flukes for convenience in carriage when the anchor is not in use. The adjustable flukes are formed upon a socket fitted upon the shank to adapt them to be slipped up and down upon it, and the shank is made with a cylindrical part near its upper end to allow the socket of the adjustable flukes to be turned upon the shank.

An improved pulley has been patented by Messrs. Gottlieb D. Husemann and Emery A. Said, of St. Louis, Mo. This invention relates to pulleys for raising and lowering window shades, mosquito bars, bird cages, and similar objects; and consists of a pulley so constructed that it shall act as a brake, in connection with its block, to hold the cord at any desired point. By simply removing the hand from the cord, the weight of the suspended object is sufficient to wedge the cord between the scoping wad and the flange, thus holding the article at any desired height.

Business and Personal.

The Charge for Insertion under this head is One Dollar a line for each insertion; about eight words to a line. Advertisements must be received at publication office as early as Thursday morning to appear in next issue.

Wanted.—To negotiate with manufacturers to manufacture and introduce Bassett's improved Fire-proof Ventilators for iron shutters, doors, etc.; or the patent for sale entire by States. Address the inventor, Geo. Bassett, 3215 La Salle Street, Chicago, Ill.

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Oxyhydrogen Burner, described in this paper Feby. 24th, is made by W. T. Gregg, 77 Fulton St., New York.

Contracts taken to manuf. small goods in sheet or cast brass, steel, or iron. Estimates given on receipt of model. H. C. Goodrich, 66 to 72 Ogden Place, Chicago.

Lightning Screw Plates, Labor-saving Tools, p. 156.

American Fruit Drier. Free Pamphlet. See ad., p. 156.

Am. Twist Drill Co., Meredith, N. H., make Pat. Chuck Jaws, Emery Wheels, Grinders, automatic Knife Grinders.

For best Portable Forges and Blacksmiths' Hand Blowers, address Buffalo Forge Co., Buffalo, N. Y.

The Chester Steel Castings Co., office 407 Library St., Philadelphia, Pa., can prove by 20,000 Crank Shafts and 15,000 Gear Wheels, now in use, the superiority of their Castings over all others. Circular and price list free.

Brass & Copper in sheets, wire & blanks. See ad. p. 157.

The Improved Hydraulic Jacks. Punches, and Tube Expanders. R. Dudgeon, 24 Columbia St., New York.

Millstone Dressing Diamonds. Simple, effective, and durable. J. Dickinson, 64 Nassau street, New York.

Tight and Slack Barrel Machinery a specialty. John Greenwood & Co., Rochester, N. Y. See illus. adv. p. 156.

Fine Taps and Dies in Cases for Jewelers, Dentists, Amateurs. The Pratt & Whitney Co., Hartford, Conn.

Woodwork'g Mach'y. Rollstone Mach. Co. Adv., p. 158.

20,000 Duc Spherical Elevator Buckets, sizes 3½ to 17 inches, constantly on hand. Telegraphic orders filled. T. F. Rowland, sole manufacturer, Brooklyn, N. Y.

First Class Engine Lathes, 20 inch swing, 8 foot bed, now ready. F. C. & A. E. Rowland, New Haven, Conn.

Trevor's Patent Key Seat Cutter. Trevor & Co., Lockport, N. Y. See page 156.

Nickel Plating.—Sole manufacturers cast nickel anodes, pure nickel salts, polishing compositions, etc. Complete outfit for plating, etc. Hanson & Van Winkle, Newark, N. J., and 92 and 94 Liberty St., New York.

Guild & Garrison's Steam Pump Works, Brooklyn, N. Y. Steam Pumping Machinery of every description.

The Celebrated Wooton Desk. See adv., page 142.

Lists 29, 30 & 31, describing 4,000 new and 2d-hand Machines, ready for distribution. State just what machines wanted. Forsaith & Co., Manchester, N. H., & N. Y. city.

Forsaith & Co., 209 Centre St., N. Y. city, have the following new, first-class modern engine lathes ready for instant shipment: 6′ x 16″, $300; 6′ x 18″, $325; 8′ x 18″, $345; 9′ x 18″, $355; 18′ x 18″, $385; 8′ x 20″, $375; 12′ x 20″, $415; 8′ x 22″, $550; 14′ x 26″, $700; 16′ x 26″, $736. Also, of new first-class upright drills, as follows: 18″, $110; 20″, $150; 24″, $185; 28″, $315; 32″, $365. One 48″ radial drill, $750. With a large stock of other machine tools.

James Hamblet, Electrical Clocks. P. O. Box 1414, N.Y.

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"Abbe" Bolt Forging Machines and "Palmer" Power Hammers a specialty. Forsaith & Co., Manchester, N.H.

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Knives for Woodworking Machinery. Bookbinders, and Paper Mills. Taylor, Stiles & Co., Riegelsville, N. J.

C. B. Rogers & Co., Norwich, Conn., Wood Working Machinery of every kind. See adv., page 124.

Scientific Books. See page 108. 100 page Catalogue free. E. & F. N. Spon, 44 Murray Street, N. Y.

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"How to Keep Boilers Clean." Book sent *free* by James F. Hotchkiss, 84 John St., New York.

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Supplement Catalogue.—Persons in pursuit of information on any special engineering, mechanical, or scientific subject, can have catalogue of contents of the SCIENTIFIC AMERICAN SUPPLEMENT sent to them free. The SUPPLEMENT contains lengthy articles embracing the whole range of engineering, mechanics, and physical science. Address Munn & Co., Publishers, New York

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Notes & Queries

HINTS TO CORRESPONDENTS.

No attention will be paid to communications unless accompanied with the full name and address of the writer.

Names and addresses of correspondents will not be given to inquirers.

We renew our request that correspondents, in referring to former answers or articles, will be kind enough to name the date of the paper and the page, or the number of the question.

Correspondents whose inquiries do not appear after a reasonable time should repeat them. If not then published, they may conclude that, for good reasons, the Editor declines them.

Persons desiring special information which is purely of a personal character, and not of general interest, should remit from $1 to $5, according to the subject, as we cannot be expected to spend time and labor to obtain such information without remuneration.

Any numbers of the SCIENTIFIC AMERICAN SUPPLEMENT referred to in these columns may be had at this office. Price 10 cents each.

Correspondents sending samples of minerals, etc., for examination, should be careful to distinctly mark or label their specimens so as to avoid error in their identification.

(1) Curious writes: In my house, into which I have recently moved, one of the rooms appears to be highly charged with electricity. The room is the back parlor, on the west side of the house, situated over the kitchen, which is on a level with the ground. Upon touching the gas fixtures, the heater, or any piece of metal in the room, a spark is produced and a stinging sensation is experienced by the person who touches. These effects seem to be more powerful with me than with any other member of my family. If I walk across the room and back to the fireplace heater, and attempt to touch any part of the heater with a poker or my finger, a spark about half an inch long, accompanied by a loud snap, is the result. Nothing of this kind is noticeable in other rooms in the house. There are no water pipes or other connections with the ground, excepting gas pipes, in this room. Can you explain the mystery (as it is to me), and say what effect, if any, the peculiar condition of the room would have upon persons who occupy it frequently? A. This phenomenon is common in houses heated by furnace; all of the conditions necessary to the generation of frictional electricity are present, and the friction of the feet on the carpet, and even of the clothing, one garment upon the other, generates electricity, while the body, being fairly insulated by the shoes and dry carpet, acts as a Leyden jar.

(2) G. L. G. says: Can you tell me of any gum or article of any kind that can be applied in a liquid form to fill the openings of wire cloth, so as to make a partially transparent sheet which will stand the weather? My idea is to obtain a substitute for glass in hot bed sash. A. Possibly gelatine may answer, in following proportions: Water, 50 ounces; gelatine, 3 ounces; bichromate of potash, 2 ounces. The latter renders the gelatine insoluble when exposed to light.

(3) J. M. L. writes: 1. I have a pump in a well 1,000 feet deep, and the tubing we pump through is 3 inches inside diameter. My neighbor has a similar well, just the same in every particular as mine. I use a 1½ inch pump and my neighbor uses a 2½ inch pump. I claim to only raise a 1½ inch column of water and my neighbor claims that I raise a 3 inch column. My pump will run at 40 pounds steam and his will stop at 40 pounds. I claim to raise a 1½ inch column and that he raises a 2½ inch column, and that the size of the tubing has nothing to do with the labor of the pump—that all depends on the size of the pump. A. You are right as to size of columns; in other words, you have a column 1½ inches and your neighbor one of 2½ inches and 1,000 feet high. The weight of these two columns are as 176 to 491. 2. What is the weight of a column of water 1½ inches by 1,000 feet? Also the weight of a 2½ inch column by 1,000 feet? A. 1½ inches diameter, 767 pounds; 2½ inches diameter, 2,127 pounds.

(4) J. B. G. asks what fire bricks are made of, and how long it takes to burn them. A. Fire bricks are made of a kind of clay that has but very little iron, hence its light color. The clay is burned in a potter's kiln, then ground into fine sand by passing it through a grinding mill or rollers. It is then mixed with just enough fresh clay to make the bricks mould easily, when it is moulded and dried upon a warm floor of tile, under which there is a flue from a furnace; then piled in a potter's kiln and brought to a white heat, occupying from a week to ten days. The clay and ground backed clay make the best brick, and they do not shrink in baking. There are several grades of fire brick. The poorer kinds are sun dried and burned in the same way as red brick.

(5) J. writes: Will you please inform me, through the columns of your paper, in regard to the power that it is possible to transmit through an 8 inch belt from the engine, there being a 30 inch pulley as a driver, the pulley making 156 revolutions per minute? Please give me as near as you can. A. 11½ horse power easily; or say 15 horse power with tight belt and favorable conditions.

MINERALS, ETC.—Specimens have been received from the following correspondents, and examined, with the results stated:

S. P. C.—The specimen is not a mineral, but a rock; probably a porphyritic variety of no value.—J. P.—Sample No. 1 is a sandstone, and No. 2 is a conglomerate. If patentable when made into bricks is a question which can only be answered by examining the Patent Office records.—C. W. S.—The specimen is slate, and is of no value.—D.—Quartz, coated with a malachite.

COMMUNICATIONS RECEIVED.

On "That Snake Trap." By J. T. H.
On Flying. By J. S.

[OFFICIAL.]

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FOR WHICH

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February 27, 1883,

AND EACH BEARING THAT DATE.

[Those marked (r) are reissued patents.]

A printed copy of the specification and drawing of any patent in the annexed list, also of any patent issued since 1866, will be furnished from this office for 25 cents. In ordering please state the number and date of the patent desired and remit to Munn & Co., 261 Broadway, corner of Warren Street, New York city. We also furnish copies of patents granted prior to 1866; but at increased cost, as the specifications, not being printed, must be copied by hand.

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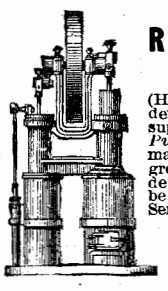

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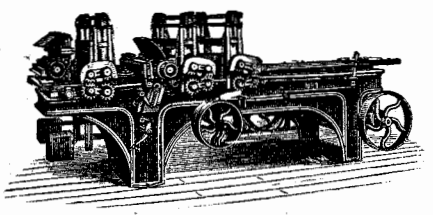

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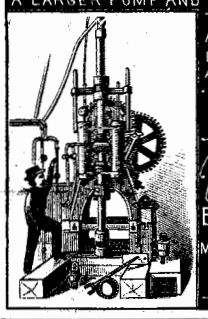

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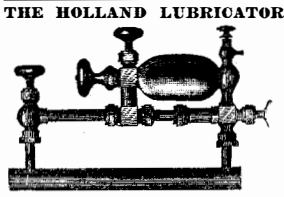

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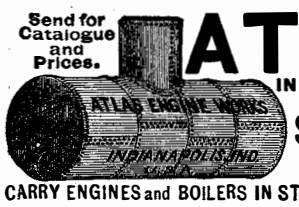

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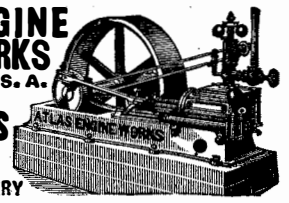

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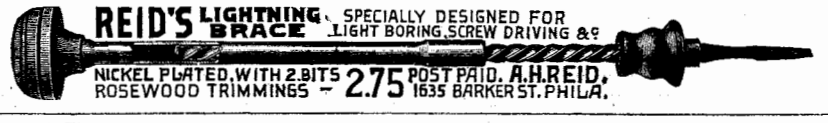
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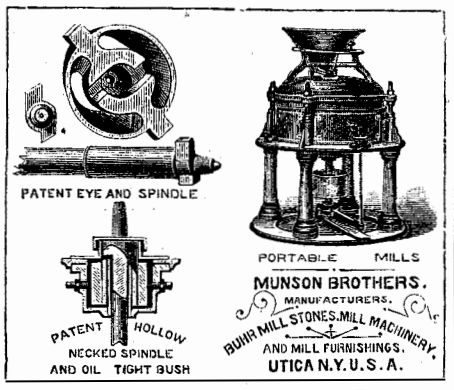
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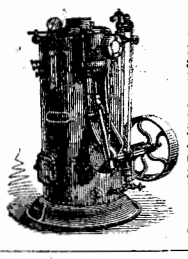

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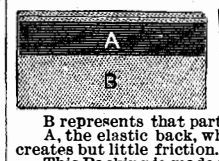

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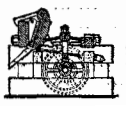

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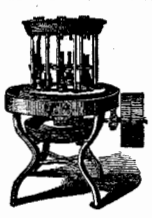

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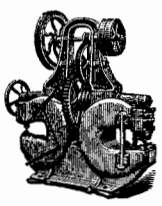

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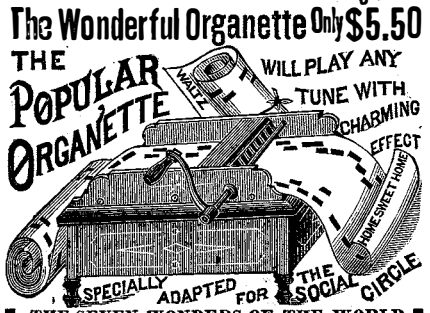

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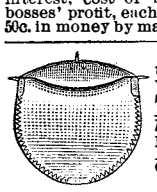

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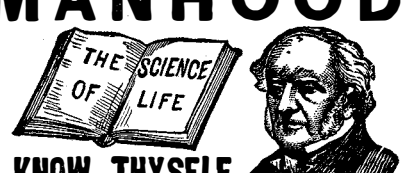

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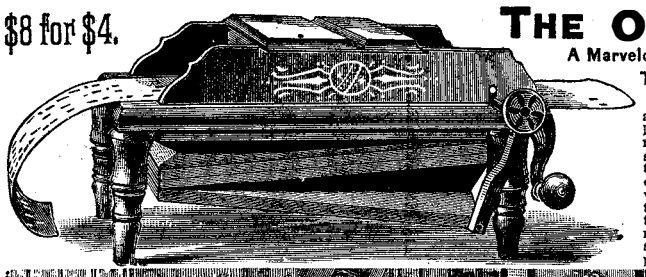

The Organette has gained such a world-wide reputation, that a lengthy description of it is not necessary. It will be sufficient to say that it is a PERFECT ORGAN that plays *mechanically* all the latest popular music, songs, dances, waltzes, jigs, etc. etc., as well as the best sacred airs. It consists of three strong bellows and a set of reeds with EXPRESSION box and SWELL. A strip of perforated paper represents the tune, and it is only necessary to place the paper tune in the instrument, as shown in the picture, and turn the handle, which both operates the bellows and propels the paper tune. The perforations in the paper allow the right reeds to sound and a perfect tune is the result, *perfect in time, execution, and effect,* without the least knowledge of music being required of the performer; even a little child can operate it as is shown in the picture, a little girl is playing a waltz, and her little friends are dancing; they are better pleased than if Strauss himself were playing for them, and older people enjoy it equally as well. It is also tuned in the key best suited for the human voice to sing by. The Organetta is perfectly represented by the picture. It is made of *solid black walnut,* decorated in gilt, and is both handsome and ornamental. The price of similar instruments has hitherto been $8, and the demand has constantly increased until now there are over 75,000 in use. We are encouraged to place the Organetta on the market at this greatly reduced price, believing that the sales will warrant the reduction. The Organetta though similar in construction is an *improvement* upon our well-known Organette, which sells for $8 and $10. It contains the same number of reeds and plays the same tunes. Our offer is this: On receipt of **$8** we will send the Organetta by express to any address, and include FREE **$4.25** worth of music, or on receipt of **$6** we will send it with **$2** worth of music FREE, **or for $4** we will send it with a small selection of music FREE. The price includes boxing and packing. *These are agent's prices,* and we will appoint the first purchaser from any town our agent, if he so desires. Address, **THE MASSACHUSETTS ORGAN CO., 57 Washington St., Boston, Mass.**

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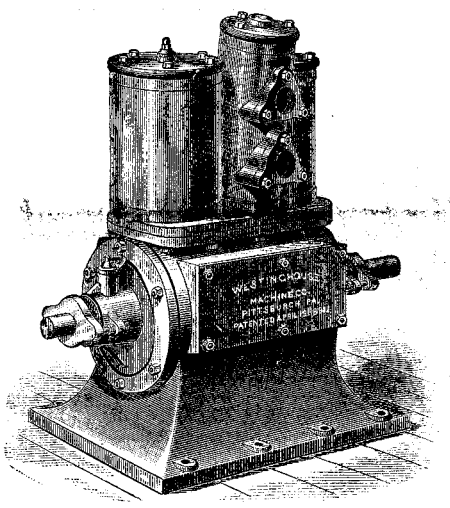

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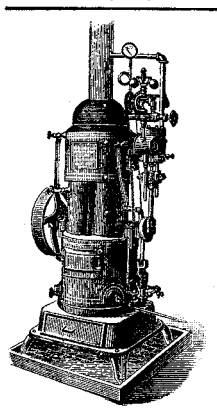

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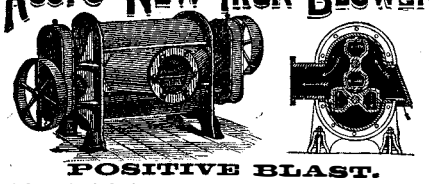

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1882.		1881.	
DAILY	14,678,656	DAILY	39,701,161
SUNDAY	7,414,114	SUNDAY	7,037,604
WEEKLY	3,443,260	WEEKLY	3,498,154
Total	55,536,030	Total	50,236,919

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SUNDAY	141,810
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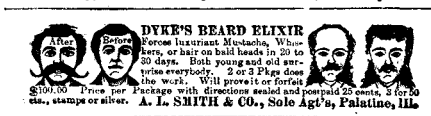

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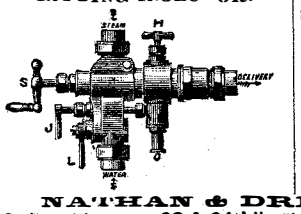

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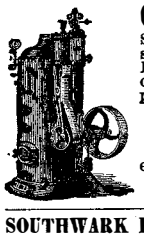
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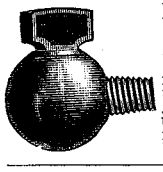
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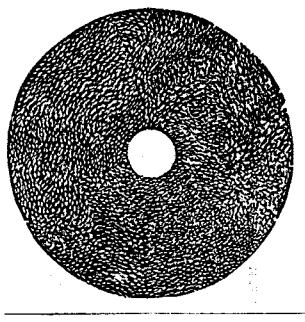
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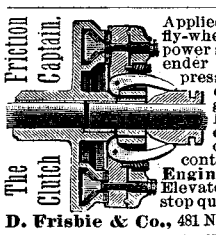

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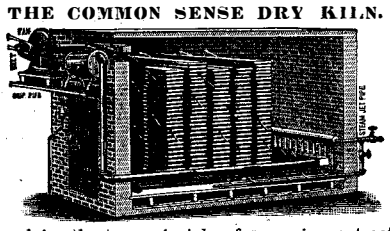
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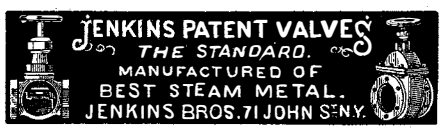

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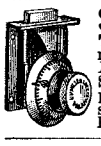
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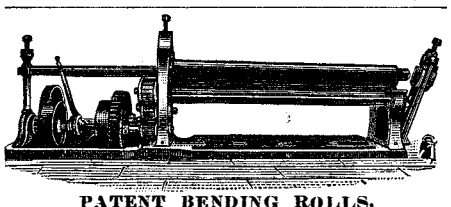
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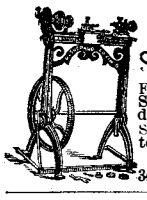
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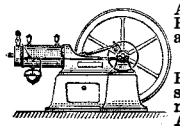
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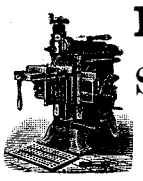
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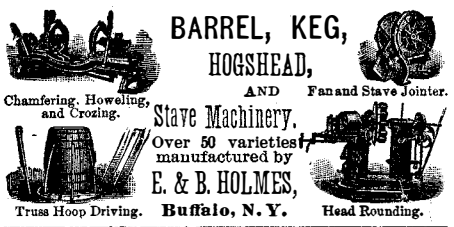

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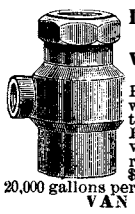
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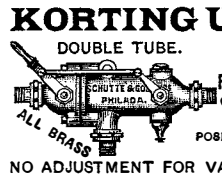

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